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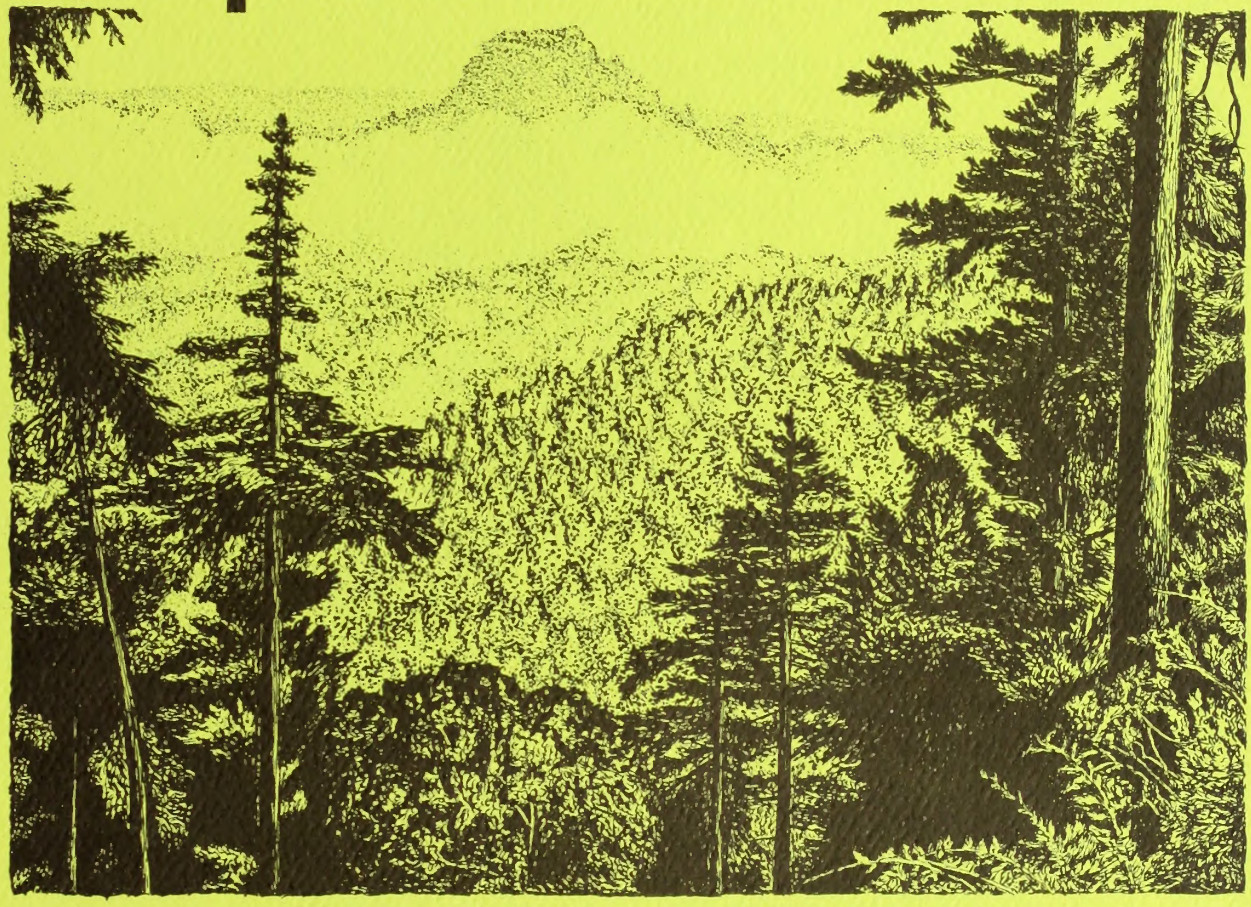
Timber Management Environmental Impact Statement



Sustained Yield Unit 13

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Enclosed for your review and comment is the *Sustained Yield Unit 13 Timber Management Environmental Impact Statement*. The Ukiah District Office of the Bureau of Land Management prepared the environmental statement in accordance with Section 102(2)(c) of the National Environmental Policy Act of 1969. The statement analyzes the impacts that would result from a proposed timber management program, along with five alternatives to that program.

Comments concerning the adequacy of this statement will be considered in the preparation of the final environmental impact statement. Written comments should be received by this office no later than November 25, 1980, in order to be included in the final statement.

Comments received after the review period will be considered in the decision process, even though they may be too late to be specifically addressed in the final environmental impact statement.

Your comments should be sent to:

District Manager
Ukiah District Office
Bureau of Land Management
P. O. Box 940
Ukiah, California 95482

Sincerely yours,

Dean Stepanek

District Manager

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DEPARTMENT OF INTERIOR

DRAFT ENVIRONMENTAL IMPACT STATEMENT

SUSTAINED YIELD UNIT 13

10-YEAR TIMBER MANAGEMENT PLAN

Prepared by

BUREAU OF LAND MANAGEMENT

UKIAH DISTRICT OFFICE, CALIFORNIA

Ron Hoffman

Actg. State Director, California

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TIMBER MANAGEMENT ENVIRONMENTAL IMPACT STATEMENT
SUSTAINED YIELD UNIT 13

September 1980
Draft (X) Final ( ) Environmental Impact Statement

1. Type of Action: Administrative (X) Legislative ( )

2. Abstract:

The Bureau of Land Management, Ukiah District, California, proposes a 10-year timber management plan for public land in Sustained Yield Unit 13 (SYU 13). SYU 13 has a timber production base of 48,682 acres located in Humboldt, Mendocino, Trinity, and Sonoma counties. The proposed action would have a 10-year allowable cut of 97 million board feet and would include rehabilitation and stand improvement on 1,460 acres. The allowable cut would provide less than 0.6 of 1 percent of the lumber and wood products employment for the region. Five alternatives to the proposal are analyzed: no action, limited investment, two accelerated harvest, and managed old-growth. This environmental impact statement will be used to revise and finalize four land-use plans and the timber management plan. The most critical issues and impacts, as identified through the scoping process, are the loss of old-growth habitat, the lowering of soil productivity, the social consequences of increased public access, and the lowering of water quality. Less critical issues are recreation, visual resources, wilderness, cultural resources, and local economics.

3. For further information contact:

District Manager
Bureau of Land Management
P. O. Box 940
Ukiah, California 95482
(707) 462-3873

4. Comments must be received by:

November 25, 1980

SUMMARY

SUMMARY

Introduction

This environmental impact statement analyzes the environmental, social, and economic effects of a Bureau of Land Management-proposed 10-year timber management plan and alternatives on Sustained Yield Unit 13 (SYU 13), Ukiah District, California. The analysis will aid in revising and finalizing four management framework plans and establishing districtwide timber management parameters. The timber production base may be adjusted as a result of this analysis, with a resultant adjustment in the allowable cut figures.

Proposed Action and Alternatives

The proposed action is an intensive 10-year program to harvest 97 million board feet of timber and to perform various rehabilitation projects on 1,460 acres. Intensive management includes precommercial and commercial thinning and hardwood control. The timber production base, a product of both the timber production capability classification inventory and management framework plans, is 48,682 acres.

As a result of public interest, current forestry research, and Council on Environmental Quality requirements, five alternatives are analyzed:

1. No Action - A historical perspective of timber activities on public land in SYU 13. A 10-year allowable cut of 78 million board feet on a timber production base of 54,247 acres. Because land-use plans and intensive inventory were not completed, the timber base was calculated using the 1974 extensive inventory and applying percentage reductions for multiple-use restrictions and land capability. All other alternatives have a timber production base of 48,682 acres.

2. Limited Investment - Timber production on a natural stand basis, which does not include such intensive operations as precommercial thinning, hardwood control, or animal control. A 10-year allowable cut of 65 million board feet, which would increase sharply after the tenth decade.

3. Accelerated Harvest #1 - A 10-year accelerated harvest of 105 million board feet, cutting to a minimum harvest age of 70 years. Other allowable cuts have a minimum harvest age of 90 years. After the tenth decade the cut would increase sharply.

4. Accelerated Harvest #2 - An accelerated harvest of 146 million board feet per decade for 3 decades, followed by a sharp decline to about 50 million

board feet per decade for 5 decades, then an increase to about 200 million board feet per decade as the forest reaches regulation.

5. Managed Old-growth - An intensive timber management plan similar to the proposal, but which sustains a proportion of old-growth components in the stands by carrying 12 trees per acre over two rotations and leaving large woody debris and snags for site maintenance. An estimated 10-year cut of 85 million board feet, which would increase sharply after the tenth decade.

Management of the timber resource in the Ukiah District has reflected the Bureau's commitment to multiple-use resource management. With the enactment of the Federal Land Policy and Management Act of 1976 (FLPMA) (P.L. 94-579), this commitment was reinforced. As a consequence of the Bureau's commitment to multiple-use and the specific direction in Section 102(a)(7) and (12) of FLPMA, the alternative of no timber harvest in SYU 13 was determined not to be a viable alternative. An alternative providing for the extensive use of aerial applications of herbicides was rejected for this 10-year period because it is economically unviable.

SCOPING

Major issues and public concerns were determined through scoping sessions with Bureau resource specialists, interested public parties and individuals, and resource management agencies. The critical issues that evolved through this process, in order of priority, are:

1. Wildlife - Maintenance and protection of habitat for old-growth-dependent wildlife species.

2. Soil and Site Productivity - Maintenance of soil for long-term timber production.

3. Access - Both for and against increased public access to public land.

4. Water Quality and Fisheries Habitat - Protection of the fisheries resource through water-quality control.

5. Recreation and Cultural and Sociocultural Resources - Increased public access for recreation and protection of cultural and sociocultural resources from timber management activities and vandalism by the public.

6. Regional and Local Economics - Maintenance of mill output and employment during an anticipated timber shortage in the next 10 to 30 years until timber on industry lands reaches merchantable size.

7. Land Uses - Land uses which conflict with the timber management plan, particularly regarding rural homes near forested public land.

Areas of Controversy

An alternative providing for the extensive use of aerial applications of herbicides was rejected as an alternative for this 10-year period because it is economically unviable. The use of herbicides has not been a normal practice of the forest management program for SYU 13. Herbicide use on a limited scale is planned in the proposal. However, this use would not be obligated in the allowable cut computation. The proposal calls for a hand-applied herbicide release spray on 135 acres of conifer site presently suffering from grass competition. Such an action would be subject to specific design features included in herbicide project plans and guidelines for application. These guidelines are listed in Appendix 2-4, "Site Preparation and Release Specifications for Chemical Treatment - Ukiah District SYU 13 Timber Management Plan." Additionally, such projects would be subject to site-specific recommendations generated from an environmental assessment.

As identified during the scoping and planning process, certain areas of public land within SYU 13 are of particular concern regarding possible forest management activities. For example, many adjacent landowners consider the Gilham Butte management block valuable for scientific and ecological studies. Other concerns are possible water-quality problems and potential watershed damage commonly associated with timber management activities. As a consequence of the Bureau's land-use planning process, approximately 1,700 acres of the Gilham Butte block are proposed in the Scattered Blocks Planning Unit (Maps 2-1 and 2-2) MFP Step 2 for exclusion from the timber production base.

Environmental Consequences

Analysis has shown that there are no appreciable differences in impacts between the proposed action and alternatives. All of the alternatives would permanently remove existing old-growth forests from the timber production base. The managed old-growth alternative would retain approximately 10 percent of the land area for two rotations to provide large woody debris for long-term site productivity. Old-growth-dependent wildlife species, such as the goshawk

and spotted owl, would be adversely affected by the removal of the overmature stands. The managed old-growth alternative would provide some degree of mitigation by providing large trees and snags.

Vegetation composition, stocking, and age would be affected by all proposals. Conifers would be favored over hardwood species, and conifer stocking would increase from about 77 to 90 percent as the forests become regulated. Mature and overmature forests would be replaced by second-growth stands that would eventually be harvested at a minimum age of 90. Genetic diversity would be lost because of inadequate provisions for cone collection by seed zone and elevation. Under the proposal, about 200 acres of productive forest on both private and public land would be permanently lost during the 10-year period due to road construction. However, in the long-run, all of the forest base would have a developed road system, so there would be no difference among the alternatives in land lost to production.

Soil and water quality would be adversely affected by increased erosion and sedimentation due primarily to road construction and yarding. Fisheries would not be significantly affected because of buffers and the scattered ownership pattern.

All of the alternatives provide less than 0.6 of 1 percent of the lumber and wood products employment for the region. Seasonal fluctuations in employment in the timber industries are greater than the employment the BLM could provide under any alternative. Therefore, SYU 13 could not provide enough timber to affect mill operations or employment on a regional basis.

Timber acreage in wilderness study areas or areas under wilderness protest are under interim management. No timber harvest or road building would be done in these areas until a final decision is made by Congress or all appeals are exhausted.

Site-specific environmental assessments will be made for each action. During these intensive investigations, sensitive, endangered, and threatened plants and animals will be identified and any problems resolved in cooperation with the U. S. Fish and Wildlife Service. Cultural resources and sociocultural sites will also be handled on a site-specific basis in consultation with State and local authorities, Native American advisory groups, and concerned individuals.

Impacts on visual resources are not anticipated to be significant under shelterwood harvesting and existing management framework plan constraints. Site-specific analysis using visual resource management contrast ratings should reduce impacts to acceptable levels in each management class. Recreation that depends on solitude and mature forests would be adversely affected by timber harvest and road building. Recreation dependent on access, such as hunting and off-road-vehicle use, would benefit from the proposal and alternatives.

Mitigation Measures

Mitigation measures were developed as a result of the analysis and are committed as part of the proposal and alternatives. Mitigation measures were developed for:

- Yarding and equipment placement
- Road construction and surfacing
- Log and snag retention
- Seed production areas
- Additional buffers on springs and seeps
- Temporary retention of standing old-growth
- Protective measures for cultural and sociocultural resources

These mitigation measures would reduce the impacts on wildlife, soils, vegetation, and water quality and would reduce the inadvertent loss of cultural and sociocultural resources.

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1

PURPOSE OF AND NEED FOR ACTION

CHAPTER 1

PURPOSE OF AND NEED FOR ACTION

PURPOSE AND NEED

This environmental impact statement (EIS) analyzes the environmental (including social and economic) impacts of a proposed timber management plan on Sustained Yield Unit 13 (SYU 13), Ukiah District, California (Map 1-1).

The Bureau of Land Management (BLM) is responsible for the prudent management of the public lands and their resources under the principles of multiple use and sustained yield in accordance with developed land-use plans. The Bureau's principal authority and direction to manage public lands under its jurisdiction is the Federal Land Policy and Management Act of 1976 (P.L. 94-579), often referred to as BLM's "Organic Act" or FLPMA.

In accordance with FLPMA, land-use plans were developed for SYU 13. This resulted in the identification of proposed harvest levels, management practices required to sustain and enhance these harvest levels, and mitigation measures required to protect the land and its resources.

The proposed action is a 10-year timber management plan for timberlands in SYU 13. The purpose and need for this plan are based on:

1. Compliance with FLPMA, Section 102(a)12, which calls for the management of public lands in a manner that "recognizes the Nation's need for domestic sources of minerals, food, timber, and fiber from the public lands...."

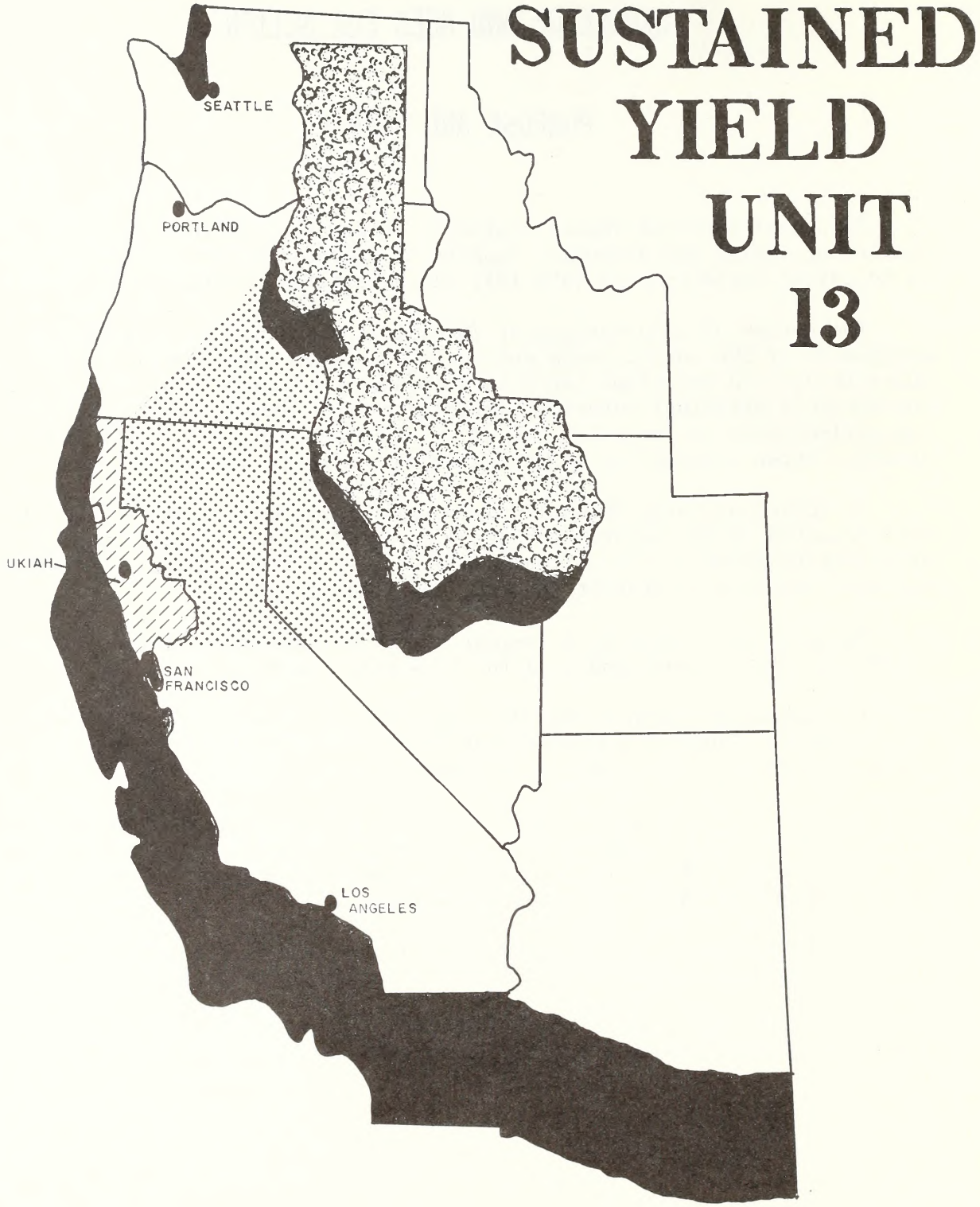
2. Settlement of the Natural Resources Defense Council's (NRDC) legal action against BLM's present timber management program, which requires a detailed analysis of "...total public land acreage proposed to be devoted wholly and/or partially to timber production...."

3. Production of an analysis that will reduce unnecessary duplication in the environmental assessment process for site-specific actions.

4. Production of a viable 10-year timber management plan to enhance timber management planning and thereby provide better guidance for annual work planning.

MAP 1-1

REGIONAL MAP



5. Production of a long-range projection and plan to regulate the current forest by increasing the growing stock levels and developing a good age-class distribution.

The plan proposes a 10-year allowable timber harvest of 97 million board feet (Scribner log rule). Emphasis would be on the two-stage shelterwood harvest method. Also included in the proposal are reforestation, hand-application of herbicides, slash disposal, road construction, precommercial thinning, and fertilization.

Historically, temporary easements have been the predominant means of access for SYU 13's timber management program. The direction from FLPMA to manage public lands on the basis of multiple use and sustained yield necessitates the development of an active access acquisition program. The future access program for SYU 13 will emphasize permanent easement acquisition.

Five alternatives to the proposed action are described and analyzed. Land and resource-use alternatives are considered in the management framework plans (MFPs), which identify timber production lands and establish timber production constraints to be imposed to protect other values. Each of the alternatives in this EIS relates to the level and nature of timber harvest within the constraints of the MFPs.

The five alternatives are:

-No Action

-Limited Investment

-Accelerated Harvest #1

-Accelerated Harvest #2 (modulated harvest)

-Managed Old-Growth

These alternatives represent a cross section of possible options pursuant to *Title 40, Code of Federal Regulations,* Sections 1500-1508 (particularly 1502.14 and 1508.25).

Harvest levels are proposed. Final decisions on land-use allocation, 10-year timber management activities, and a sustained-yield allowable cut in SYU 13 cannot be made until 30 days after the final EIS is filed with the Environmental Protection Agency (EPA) and the "Notice of Availability" is published in the *Federal Register.* All conflicts, alternatives, the environmentally preferred action, economic and technical considerations, and the Bureau's statutory mission will be discussed in the "Record of Decision."

ORGANIZATION OF THIS ENVIRONMENTAL IMPACT STATEMENT

Analysis of the proposal and alternatives entails a complicated process of writing, analyzing, rewriting, and re-analyzing. To facilitate an understanding of the procedures which went into this analysis, the following explanations are provided:

1. Chapter 2 describes the discrete actions and management philosophies of the proposal and alternatives.

2. Chapter 3 describes the environment which would be affected by implementation of the proposal or alternatives to provide background for the reader to assess the significance of the impacts.

3. Chapter 4 includes several types of analysis:

-The first section of Chapter 4 analyzes the impacts of the proposed action and alternatives exactly as they are described in Chapter 2.

-As a result of the impacts analysis, various mitigation measures were developed and presented to management.

-Mitigation measures that were accepted by management are included as part of the proposal and alternatives (Table 2-4). Mitigation measures that were not acceptable due to funding and manpower constraints or that require further analysis are presented as "Other Possible Mitigation" at the end of Chapter 4.

-Impacts remaining after application of the committed mitigation measures are described in Chapter 4, "Unavoidable Adverse Impacts," "Relationship Between Local Short-Term Uses of Man's Environment and Maintenance and Enhancement of Long-Term Productivity," and "Irreversible and Irretrievable Commitment of Resources."

2

ALTERNATIVES INCLUDING THE PROPOSED ACTION

CHAPTER 2

ALTERNATIVES INCLUDING THE PROPOSED ACTION

SCOPING

In November 1978, the President's Council on Environmental Quality (CEQ) released new regulations for implementing the procedural provisions of the National Environmental Policy Act. These regulations augment and reinforce the Bureau's approach to issue identification and determination of scope for its planning and analysis efforts. The CEQ regulations call for an early and open "scoping" process to determine the scope of issues to be addressed, to identify the significant issues related to a proposed action, and to eliminate from detailed study any insignificant issues addressed in prior environmental assessment. The regulations further direct the lead agency to invite the participation of affected Federal, State, and local agencies and other interested parties.

Scoping for the *Sustained Yield Unit 13 (SYU 13) Timber Management Environmental Impact Statement* was initiated on April 20, 1979. Interested or affected individuals, groups, agencies, and organizations were contacted and asked to participate in the identification of issues and the development of alternatives. Appendix 2-1 is a detailed listing of the specific actions involved in the SYU 13 scoping process.

ISSUES

The scoping process for SYU 13 identified the following central issues for analysis. The issues are listed in order of priority as determined by scoping participants and by public input during the planning process.

1. Timber Management and Wildlife Habitat:

   - Old-growth component of wildlife habitat and timber harvesting (in particular, spotted owl and other old-growth-dependent species).

   - Wildlife habitat and acres of rehabilitation (e.g., mechanical scarification of hardwood or brush-occupied conifer sites).

- Reduction of available aquatic habitat (especially for anadromous fish species).

- Increase in animal populations dependent on early successional stages (e.g., deer and bobcat).

2. Timber Management Activities and the Soil Resource and Site Productivity:

- Possible reduction of site class due to increased erosion and loss of soil moisture.

- Slope stability as it relates to timber harvest and road construction.

- Increase in productivity (yield) due to intensified management.

3. Access and the Timber Management Program:

- Although biological and physical impacts were identified as a consequence of increased access to public lands, social impacts related to improved access were identified as being more of an issue through: (1) increased public access to previously inaccessible public parcels and subsequent increase of trespass on private lands, (2) reduction of exclusive use of public land by adjacent private landowners, and (3) litigation via condemnation proceedings to secure access to public forest lands.

- Intensified management of public forest lands through increased acquisition of access.

- Improved access for fire control and fuel management activities.

4. Timber Management Activities and Water Quality:

- Timber harvest and road construction as they relate to increased sedimentation.

- Off-site direct and cumulative effects from harvest and road building (downstream).

- Increases in water yield.

5. Timber Management Activities and Cultural and Sociocultural Resources and Recreation:

- Increased probability of vandalism of cultural and sociocultural sites.

- Increased probability of loss or damage of cultural and socio-cultural sites due to road construction or harvesting activities.

- Increased probability of cultural and sociocultural site discovery due to road construction and other timber management activities.

- Increased probability of visual impact as a consequence of timber management activities, (e.g., harvesting, road construction, rehabilitation projects).

- Preservation of isolated stands (old-growth) as they relate to timber harvesting.

- Increased opportunity for recreation use due to increased access.

6. Timber Management Program and its Relationship to Local and Regional Economics:

- The timber industry has identified a current lag in the quantity of harvestable timber on private land. The timber industry is looking to timber on public land to fill this gap until private timber reaches harvestable age. The industry feels that if this lag is not filled by public timber, lumber and wood products production will decline with subsequent loss of employment in this sector.

7. Land Use and the Timber Management Program:

- Conflicting land uses (e.g., possible conflict of timber management activities adjacent to a designated natural area).

- Land disposal or exchange for more effective management.

PLANNING AND LAND-USE ALLOCATION

The BLM-managed public lands included in the proposal are a result of the Bureau planning system (BPS). The BPS involves several discrete components, each of which has public involvement as an integral part of its formulation and successful completion.

The planning system uses inventory data to prepare unit resource analyses, where management opportunities are first identified for an individual resource. After resource opportunities are identified in the unit resource analysis (URA), BLM resource specialists develop recommendations to maximize their particular resource. This process identifies potential resource conflicts. The identification and resolution of these conflicts constitute the essence of the land-use allocation process.

The entire BPS process, through inventories, unit resource analyses, and planning area analyses, results in the development of a resource management plan. This management plan, known as a management framework plan (MFP), identifies management objectives, provides for land-use allocations, and determines guidelines for multiple-use management.

During the MFP phase of the BPS, all potential conflicts and ways to resolve these conflicts are analyzed. As a consequence of this analysis process, alternatives that best resolve conflicts, while adhering to the precept of multiple-use and maintaining maximum possible quality and quantity of all resource values involved, are selected.

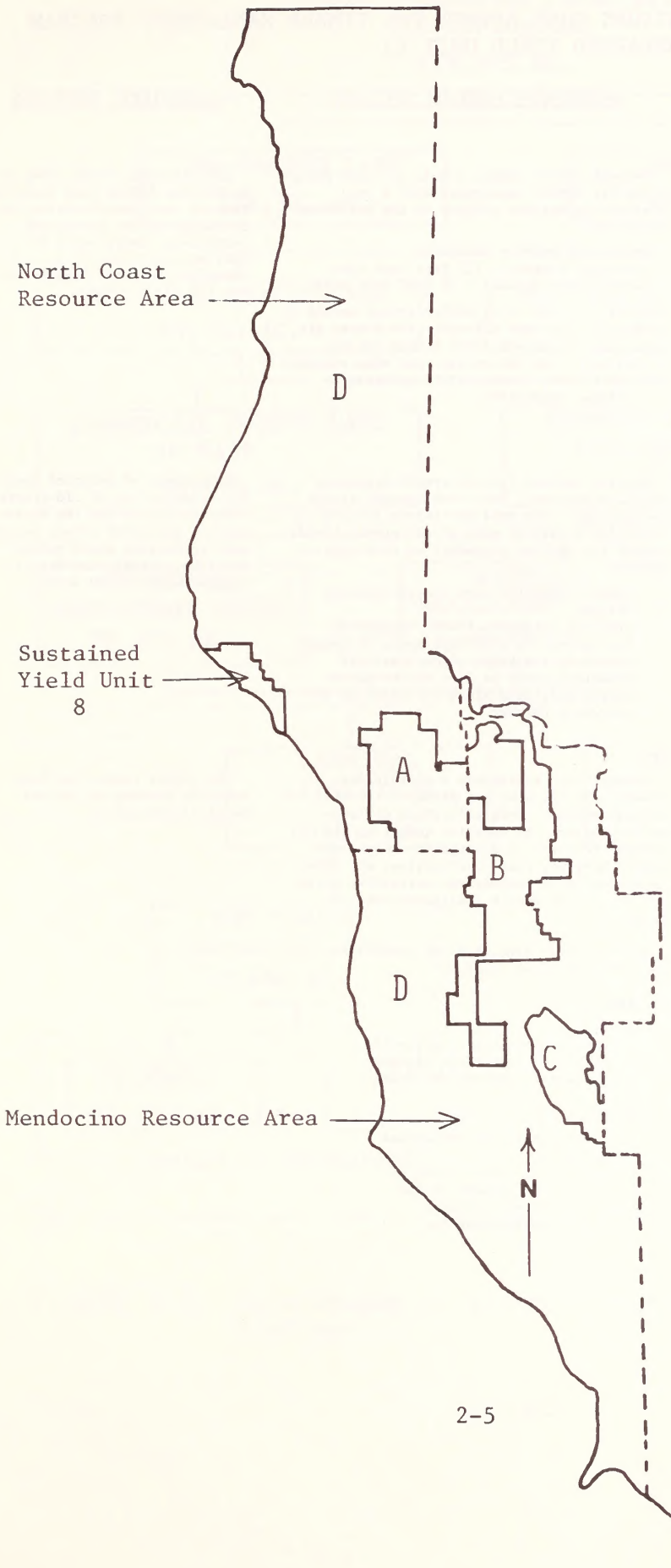
The timber production base analyzed in this environmental impact statement (EIS) was identified through the land-use planning process and is derived from MFPs for four administrative planning units: Cow Mountain, East Mendocino, Red Mountain, and Scattered Blocks (Map 2-1). Two of the MFPs (Red Mountain and Scattered Blocks) do not have completed land-use allocation decisions (MFP Step 3). Consequently, the allowable cut computations for the proposal and alternatives are based on two Step 2 (proposed) MFPs and two Step 3 (completed) MFPs. Table 2-1 summarizes the significant MFP recommendations that affect the SYU 13 timber management program.

As shown in Table 2-1 and Figure 2-1, the land-use planning process resulted in significant resource tradeoffs. Figure 2-1 shows that approximately 20 percent of the productive forest land base has been designated for other resource considerations.

This is a regional timber management environmental impact statement as opposed to a site-specific land-use allocation or timber sale plan. Upon completion of this EIS and the record of decision, MFP Step 3 decisions will be revised and finalized for the four planning units. Use of this statement, planning documents, and public input could result in certain areas being added to or deleted from the timber production base. Final allowable cut calculations will follow this EIS.

MAP 2-1

PLANNING UNITS-SUSTAINED YIELD UNIT 13



A - Red Mountain Planning Unit

B - East Mendocino Planning Unit

C - Cow Mountain Planning Unit

D - Scattered Blocks Planning Unit (This unit contains over 270 parcels with an average size of less than 120 acres. The parcels in this administrative unit lie in two resource areas and range from Del Norte County to the north to Sonoma County to the south.)

TABLE 2-1

SIGNIFICANT MFP RECOMMENDATIONS THAT AFFECT THE TIMBER MANAGEMENT PROGRAM SUSTAINED YIELD UNIT 13

MULTIPLE USE ISSUES	RECOMMENDED LAND USE DECISION	SIGNIFICANT TRADEOFFS
STREAM BUFFERS:		
Impacts associated with timber management activities on fisheries, wildlife, watershed and recreation values.	Harvest mature timber stands on lands designated for timber management with 2 or 3 shelterwood systems subject to the following practices: Streamside buffers (minimum) Perennial streams - 125 feet each side Intermittent streams - 75 feet each side Removal of timber from buffer strips should be permitted only when adjacent side slopes are less than 35 percent, when timber can be felled away from the stream, and when adequate shading of the stream will be maintained by residual vegetation.	Approximately 3,900 acres of productive forest land would be removed from consideration for intensive forest management practices. Entry would be limited, resulting in a reduction in the allowable cut for SYU 13.
WILDLIFE HABITAT AND WATERSHED MAINTENANCE:		
Impacts associated with management activities on wildlife species, especially those dependent on old-growth timber for survival. Effects timber management activities have on watershed integrity.	Provide habitat for old-growth-dependent wildlife species. This would permit timber harvest but would make provisions for preservation of all or part of old-growth timber stands for species dependent on this type of habitat. - manage indicated area for spotted owl habitat - preclude intensive forest management, but harvest on a salvage basis if damage occurs to the trees through natural disasters, such as fire and windthrow - manage indicated areas for wildlife and watershed values	Management of selected lands for preservation of old-growth characteristics and the exclusion of intensive forest management activities would reduce the timber production base by approximately 4,200 acres.
NATURAL AREAS:		
The effects of timber harveat and other timber management activities on scientific, educational, and aesthetic values on sites identified as having such features.	Manage areas previously available for resource utilization for preservation of natural values. This allocation decision would preserve the pristine qualities and natural features of endangered ecosystems. Timber harvest, road construction, and other intensive forest management activities would not be allowed within designated natural areas. Some specific permitted and prohibited uses in such areas could be: Permitted: - scientific study - day-use hiking and sightseeing - control of insect and disease epidemics by mechanical means Prohibited: - fire control with mechanized equipment - chemical use for control of insects and disease or for vegetative manipulation - mineral exploration and extraction.	The timber production base would be reduced by approximately 3,800 acres.

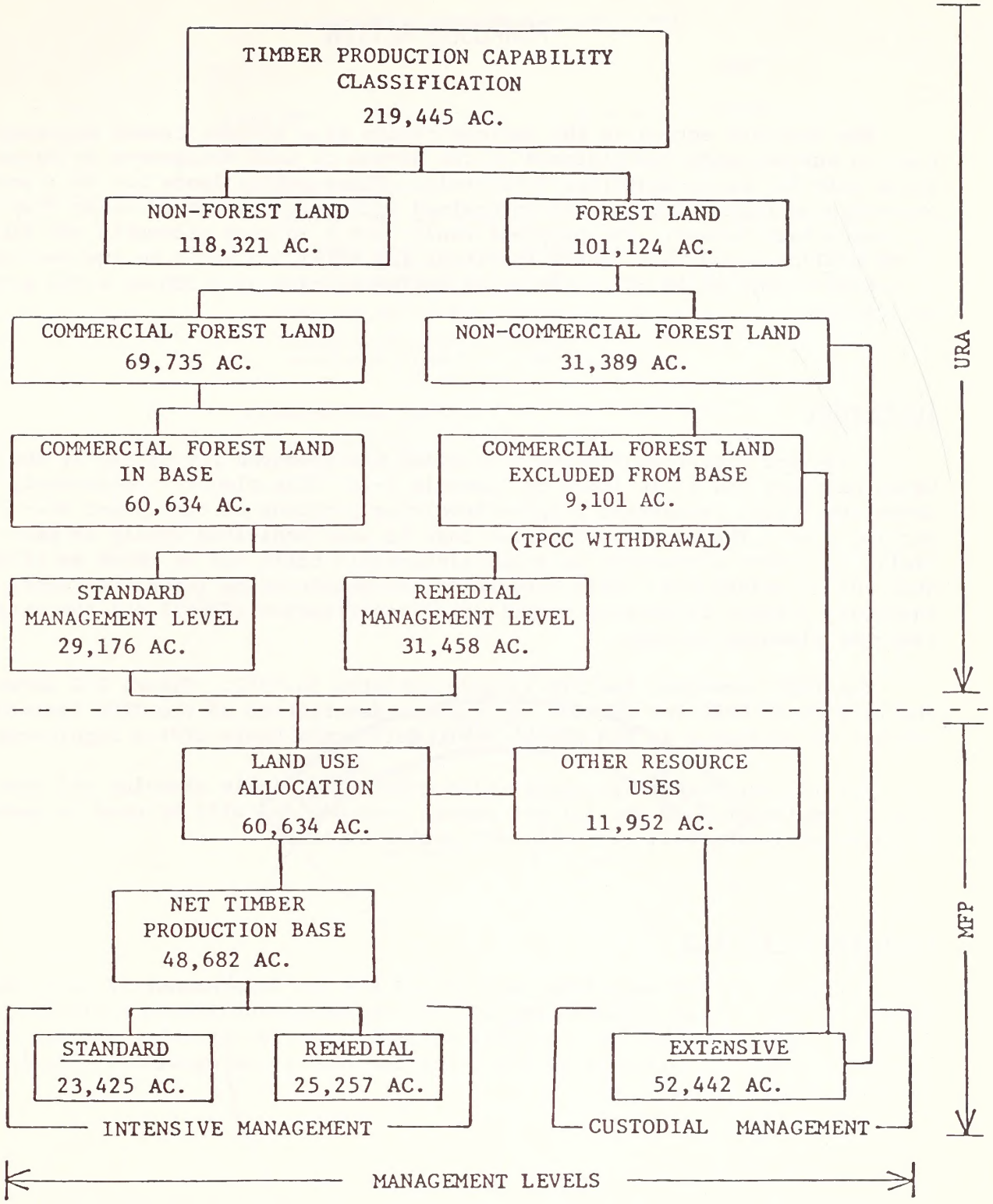


FIGURE 2-1. Relationship of land-use planning to productive forest land base.

PROPOSED ACTION

The proposed action is the implementation of a 10-year timber management plan on public lands administered by the Bureau of Land Management in Sustained Yield Unit 13, Ukiah District, California. These public lands lie in a scattered ownership configuration and are intermixed with privately owned lands (Map 2-2, inside back cover). The proposal would have a 10-year allowable cut (AC) of 97 million board feet (MMBF) (Scribner log rule) and would be implemented on a timber base of 48,682 acres at an estimated rate of 3,000 to 4,000 acres per decade.

INVENTORY

A 10-year timber management plan model was prepared for SYU 13 by the Ukiah District and is included in Appendix 2-2. This plan is a moderately intensive forest management program involving portions of the timber production base. The timber production base is land dedicated wholly or partially to timber production on a sustained-yield basis and on which an allowable cut is calculated. This acreage is the result of an intensive forest inventory (Timber Production Capability Classification (TPCC)) and the Bureau's land-use planning process.

The TPCC inventory for SYU 13 was initiated in 1977. Figure 2-2 shows the results of TPCC for SYU 13. A complete description of the TPCC inventory process is available in BLM Manual 5251, California State Office Supplement.

The 10-year timber management plan model is a viable planning aid that will be implemented to the fullest extent possible and will be used to quantify probable environmental, economic, and social impacts.

MANAGEMENT LEVELS

Analysis of TPCC data disclosed a need for the development of management levels for the forest lands in SYU 13. Three management levels (standard, remedial, and extensive) have been identified. The relationship between TPCC, the Bureau land use planning process, and the identified management levels are shown on Figure 2-1.

TIMBER PRODUCTION CAPABILITY CLASSIFICATION - 1978

Category:		ACRES
Forest Land		101,124
Commercial Forest Land		69,735
Commercial Forest Land in Base		60,634
Nonproblem Sites	24,154	
Physical Problem Sites	5,100	
Reforestation Problem Sites	31,380	
Commercial Forest Land Excluded from Base		9,101
Physical Problem Sites	8,298	
Reforestation Problem Sites	803	
Noncommercial Forest Land		31,389
Noncommercial Species	26,504	
Noncommercial, Low Site	4,885	
Nonforest Land		118,321
Total Acres Inventoried in SYU 13		219,445

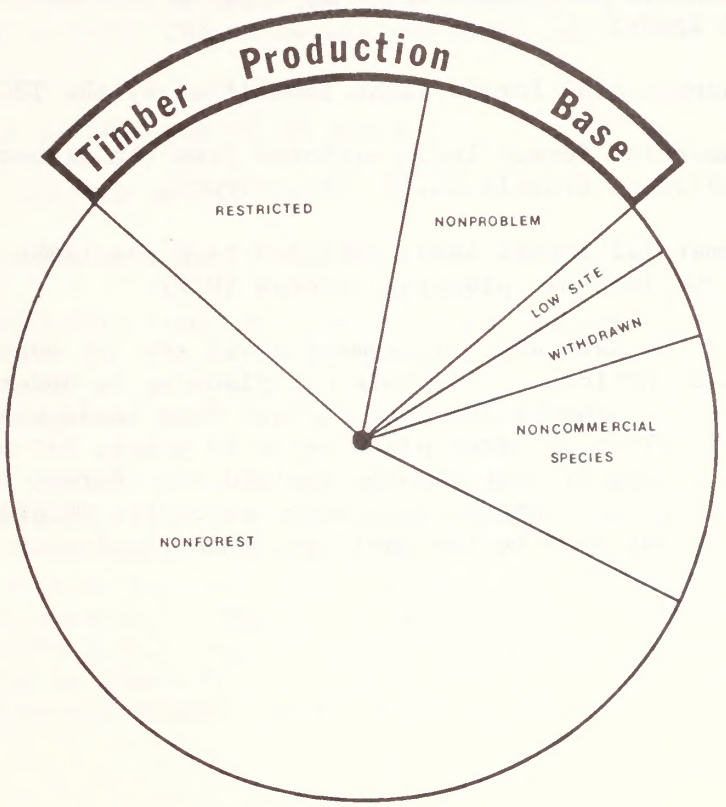


FIGURE 2-2 Timber Production Capability Classification

INTENSIVE MANAGEMENT LEVELS

Standard Management

The standard management level is applied to commercial forest lands that are suitable for continuous timber production with reasonable assurance of successful results from the application of intensive timber management practices. These lands have prompt regeneration capabilities, can support frequent and predictable returns, have the ability to support short and predictable rotations, and require minimal monetary investment for silvicultural treatments.

Remedial Management

Commercial forest lands at the remedial management level have the same potential as those under standard management except they require significant monetary investment to effect appropriate and needed silvicultural treatments to return them to full production capability. These lands typically suffer from one or more of the following problems: (1) understocking, (2) significant competition with undesirable species (brush, grasses, etc.), and/or (3) animal damage. These lands are included in the standard management level after the problem(s) are remedied.

EXTENSIVE MANAGEMENT LEVEL

The extensive management level is applied to three categories of BLM-administered lands:

1. Noncommercial forest lands identified by the TPCC inventory.

2. Commercial forest lands excluded from the timber production base due to steep gradients, fragile soils, etc. (TPCC).

3. Commercial forest lands excluded from the timber production base as a result of the land-use planning process (MFP).

Lands in the extensive management level are not considered in the allowable cut determinations. Allowable cut planning is undertaken periodically to determine the sustainable level of harvest from lands used for timber production. Normally, this planning takes place every 10 years, but may occur more often in the event of significant changes in land use, forest condition, or technology. As a consequence, the forest lands under extensive management may be re-evaluated at a future date for their potential inclusion in the productive forest base.

Forest management activities on lands under extensive management are limited to a custodial management approach. Stand entry is limited to corrective actions to protect or prevent damage to timber and other resources as a result of fire, insect outbreak, etc.

Allowable Cut Calculation

The allowable cut is the volume of timber that can be periodically removed from forest land judged to be environmentally and economically suitable for the continuous production of timber within the considerations of multiple-use management (BLM Manual 5240). The allowable cut is based on a 1974 extensive inventory with TPCC and MFP acreage adjustments. The computer model is a standard SIMIX model. (This model does not determine or prescribe the optimum solution for the actions under consideration; it simply provides statistical data to measure or compare the impacts of alternatives or assumptions on timber production). Ten percent of the total basal area of future stands is calculated to be a hardwood component and 90 percent the desirable conifer species. The desirable conifers are Douglas-fir, sugar pine, ponderosa pine, white fir, incense cedar, redwood, grand fir, Port-Orford-cedar, western redcedar, and hemlock.

The allowable cut is a function of current stand structure and growth potential of the forest and depends on many cultural treatments and criteria. Treatments must be carried out to meet the growth demands on the forest imposed by the allowable cut. The allowable cut calculations for this 10-year plan assume:

- Harvesting at a minimum age of 90 years.
- Precommercial thinning at age 20.
- Commercial thinning at ages 50 and 80.
- Adequate stocking with conifers within 5 years after initial entry.
- Returning existing unstocked stands to production within 3 decades.

The allowable cut calculations do not include the increased volumes that could be obtained from such intensive forest management treatments as the application of fertilizers and herbicides. Due to the lack of immature age classes, the present reserve of timber must be allocated throughout the critical period, which extends through the ninth decade. After this period, the cut must be modulated sharply upward due to a better age class distribution and an estimated increase in growing stock levels. In a perfectly regulated forest, the annual growth and allowable cut are estimated to be 20 million board feet.

PARAMETERS

The 10-year timber management plan model (Appendix 2-2) identifies the discrete forest management activities for the proposed action and alternatives. These activities incorporate design features as developed by the Ukiah District staff, BLM manuals, and the Bureau planning process. They represent an appropriate level of specificity for analyzing impacts generated throughout SYU 13 under typical circumstances. Site-specific interpretation of these design features will be considered on a case-by-case basis and modified as necessary to reduce anticipated impacts. Environmental assessments (EAs) will be prepared for discrete timber management projects to evaluate site-specific problems.

ROADS

Access will be provided by the development of permanent road systems within all areas identified for intensive forest management and within permanent easements. Road design criteria will reflect the minimum standards acceptable for timber harvesting equipment on public lands, with somewhat higher standards where BLM roads become significantly used for public access.

Roads will be constructed in locations that require minimal surface disturbance and will avoid unstable areas and slopes in excess of 70 percent. A concerted effort will be made to use existing roads in developing road systems. However, a designed road will be built in preference to existing roads that are in poor locations, have excessive grades, or have severe drainage problems. Right-of-way clearing will be kept to a minimum width and will not normally exceed 5 feet above the top of the cut and 5 feet below the toe of the embankment. Vegetation will be removed for the primary purposes of reducing hazard and preventing undue shading of the road. Small trees and brush will be left in place to help stabilize cut and fill slopes.

Mainline roads will be designed as single-lane, low-traffic-capacity roads. Normal subgrade width will be 16 feet with an additional 4 feet for a ditch. Mainline roads will be ditched and will have appropriate drainage structures. In accordance with BLM Manual 9113, the normal maximum grade will be 8 percent favorable and adverse where possible.

Spur roads used exclusively during timber harvesting will have a 14-foot subgrade and no ditch. Such spurs will be outsloped during construction and waterbarred and not maintained until the next stand entry. Spurs will be physically blocked to prevent unauthorized use.

Full-bench excavation with endhauling of waste material will be used on slopes exceeding 60 percent. Waste areas will be included in the road design and will include additional waste areas for slides that may occur after

construction. Waste areas will be located so that material will not erode into streams, lakes, or reservoirs.

An active program of road dust abatement will be implemented on all active timber sales.

Cut and fill slopes and waste areas will be revegetated where necessary to reduce surface sloughing.

All stream crossing structures will be designed and constructed to allow free passage of fish in streams where a significant fisheries resource exists.

SILVICULTURAL SYSTEMS

A multistage shelterwood cutting system will be emphasized in SYU 13. Where advance regeneration is lacking, cutting will leave an overstory of between 30 and 50 percent canopy cover on the most and least favorable aspects, respectively. Well-spaced, vigorous, and well-formed codominants will be favored as "leave" trees. Where such trees are lacking or are in insufficient numbers, less desirable trees will be left. This includes hardwood species on sites with inherent heat problems.

Where full stocking with advance regeneration occurs, overstories will be removed and regeneration will be simultaneously precommercially thinned.

YARDING SYSTEMS

Commensurate with the application of shelterwood as the primary silvicultural system, cable yarding will normally be the only system used on slopes over 35 percent. Tractor yarding will be limited to slopes under 35 percent. Although the slope may be less than 35 percent, skidders that exert low ground pressure or cable yarding systems will be required on areas highly susceptible to erosion or areas with slope stability and compaction and puddling problems. High-lead yarding will normally be used where slope dictates tractor restrictions and where topographic limitations will not permit a skyline setup. For future use, permanent features of cutting units, such as roads and landings and tailholds, will be left in a usable condition. Skid trails and tractor yarding will not be allowed in natural drainageways to ensure that the natural drainage network is left intact.

BUFFER STRIPS

Buffer strips are defined as zones of relatively undisturbed forest along perennial and intermittent drainages designed to protect riparian and aquatic ecosystems and the watershed from forest management activities.

Buffers will be a minimum width of 125 feet (horizontal distance) from the edge of the stream for perennial streams and 75 feet for intermittent streams.

Root wads and slash that accumulate in the drainages as a result of logging operations will be removed. However, the buffer strip will eliminate this need in most cases. There will be no intermediate cuts, fertilizing, or other practices within the buffer.

HERBICIDES

The use of herbicides has not been a normal practice of the forest management program for SYU 13. Herbicide use on a limited scale is planned in the proposal. However, this use will not be obligated in the allowable cut computation. The proposal calls for a hand-applied herbicide release spray on 135 acres of conifer site presently suffering from grass competition. Such an action would be subject to specific design features included in herbicide project plans and guidelines for application. These guidelines are listed in Appendix 2-3, "Site Preparation and Release Specifications for Chemical Treatment - Ukiah District SYU 13 Timber Management Plan." Additionally, such projects would be subject to site-specific recommendations generated from an environmental assessment.

Specific projects for herbicide use in SYU 13 are developed in the Ukiah District Office. All proposed use of herbicides on public lands will be reviewed in advance for approval by the Bureau's Washington, D. C., office and will comply with Environmental Protection Agency guidelines.

SLASH DISPOSAL AND SITE PREPARATION

Gross yarding of unmerchantable logs greater than 8 inches in scaling diameter and 10 feet long will be the primary means of decreasing slash after harvest. Dimensional requirements may be reduced to assure plantability and reduce fire hazard in extremely dense stands of young hardwoods. Gross yarding will also serve to add an increment of surface scarification to that obtained by yarding of merchantable logs. Cull logs will either be piled on landings for burning or used for firewood. Burning will take place only on the California State Air Resources Board designated burn days.

All slash disposal requirements, including gross yarding and fire trail construction, will be included in all timber sale contracts where applicable. Mechanical treatment of brush and slash, such as the use of choppers and cutters, will be limited to slopes of 35 percent or less. Lopping, scattering, and spot burning of concentrations will also be used.

Sufficient site preparation/scarification will normally be provided during harvest activities. However, on slopes of 35 percent or less, additional scarification will be provided by mechanical means where needed.

REGENERATION

Regeneration will be established within five years after initial entry. Natural regeneration will be favored as the primary means to retain diversity and ensure adaptation of seedlings to the site. Artificial regeneration will be used to augment natural regeneration under shelterwoods and where there is not sufficient overstory for good seeding. Before final cuts in shelterwood and seed-tree areas are made, stocking surveys will be done to ensure that the area is sufficiently stocked.

ANIMAL DAMAGE CONTROL

Old Plantings

To date, there is no effective practical method to control animal damage to older plantings. Such measures as fencing and poisoning are unacceptable from an economic and environmental standpoint.

New Plantings

Where a need is anticipated, plastic tubing (such as Vexars) will be used on newly planted stock.

FERTILIZATION

Fertilization is proposed on 75 acres. The proposed rate of application is 200 pounds of nitrogen per acre. Fertilizer will be applied four years after precommercial thinning of the areas. This is a study project and will not be obligated in the allowable cut computation.

INSECT CONTROL

Epidemic outbreaks of destructive insects will be controlled with the advice and cooperation of the U. S. Forest Service, as stated in BLM Manual 5800.

SANITATION/SALVAGE

Large-scale fire kill and catastrophic windthrow will be logged on an immediate basis, while minor cases will be handled whenever possible. The purpose will be to salvage any merchantable volume and prevent serious spread of diseases and insects.

Exceptions to the measures discussed above are dictated by the scenario for each alternative.

INTERRELATIONSHIPS

CULTURAL AND SOCIOCULTURAL RESOURCES

Cultural Resources

The Bureau is required to identify, evaluate and protect cultural resources on public lands under its jurisdiction and to ensure that Bureau-initiated or Bureau-authorized actions do not inadvertently harm or destroy Federal or non-Federal cultural resources. These requirements are mandated by the Antiquities Act of 1906; the Reservoir Salvage Act of 1960, as amended; the National Environmental Policy Act of 1969; Executive Order 11593; and the Federal Land Policy and Management Act of 1976.

In accordance with the Mendocino County Archaeological Ordinance, BLM cooperates with the Mendocino County Archaeological Commission to preserve and protect significant prehistoric sites. The commission reviews all surface-disturbing activities in the county and issues excavation permits.

To protect and preserve significant cultural resources, the Bureau will ensure that Class III intensive field inventories are completed prior to authorizing any project in areas not previously examined by an archaeologist. All inventories will be completed by a qualified professional archaeologist (36 CFR 66).

If it is impossible to avoid prehistoric or historic sites, methods of data retrieval must be developed, such as surface collection and/or excavation. All data retrieval programs will conform to those standards set forth in 36 CFR 66.

Pursuant to Section 106 of the National Historic Preservation Act and Paragraph 2(b) of Executive Order 11593, the State Historic Preservation Officer and the Advisory Council on Historic Preservation will receive documentation and comments will be requested from them prior to the implementation of all actions which might affect cultural resources eligible for inclusion on the *National Register of Historic Places*. The documentation will identify the nature and intensity of impacts anticipated, proposed mitigation, and other pertinent information necessary to allow a determination of effect. The Advisory Council procedures as prescribed by 36 CFR 800 and Bureau policy guidelines will be followed. The Bureau will submit similar documentation to the Mendocino County Archaeological Commission for projects conducted in that county.

The Bureau will include a special lease stipulation in all contracts that will require all operators, permittees, and others to immediately bring to the attention of the Bureau any undiscovered antiquities or other objects of historic or scientific value or interest, including but not limited to historic

or prehistoric ruins, fossils, or artifacts. The contractor will immediately suspend all operations in the vicinity of the cultural value and notify the Bureau of the findings. Operations may resume at the discovery site upon receipt of written instructions and authorization from the Bureau.

Sociocultural Resources

The American Indian Religious Freedom Act of 1978 (P.L. 95-341) requires all Federal agencies to evaluate their policies and procedures to determine possible impacts upon the traditional religious practices and beliefs of Native Americans. In accordance with Federal legislation and the Bureau's Memorandum of Understanding with the California Native American Heritage Commission, an inventory of sites significant to Native Americans was completed for the SYU 13 study area (Marks and Bramlette 1979). The Bureau will ensure that site-specfic mitigation measures are designed and implemented in consultation with the appropriate regional Native American Advisory Group.

ENDANGERED SPECIES

Any possible impacts involving endangered species will be resolved through cooperation and consultation with the California Department of Fish and Game and the U.S. Fish and Wildlife Service as required by Section 7 of the Endangered Species Act of 1973, as amended 1978 and 1979.

ALTERNATIVES

Alternatives were selected on the basis of:

1. Public demand (accelerated harvest).

2. Feasibility of implementing the alternatives in respect to access requirements, funding, manpower, and current technology.

3. Council on Environmental Quality (CEQ) requirements (no action).

4. Timber site maintenance based on recent research regarding long-term site productivity (managed old-growth).

Management of the timber resource in the Ukiah District has reflected the Bureau's commitment to multiple-use resource management. With the enactment of FLPMA, this commitment was reinforced. As a consequence of the Bureau's commitment and specific direction in Sections 102(a)(7) and (12) of FLPMA, the alternative of no timber harvest in SYU 13 was determined not to be a viable alternative.

An alternative to use extensive aerial applications of herbicides was rejected as a viable alternative for this 10-year period because it is economically unviable.

No Action

The no action alternative is the continuation of the present policies into the future. This is a nebulous alternative, as the Bureau's policies have changed significantly since the passage of the Federal Land Policy and Management Act (FLPMA), and the proposed action actually reflects current policies.

Another difficulty in projecting present policy into the future is that the King Range National Conservation Area (SYU 8), which is excluded from this analysis, has historically had a disproportionately higher level of timber activity than the rest of the district (SYU 13) due to easier access and a consolidated land pattern. As acquired lands in the King Range become rehabilitated and permanent access is acquired into the scattered blocks outside the King Range, this situation is less likely to occur.

For analysis, a historical perspective was chosen. The 15-year period from 1964 to 1978 was researched to determine what timber management practices occurred within SYU 13. Timber management practices were sporadic. Clearcuts accounted for most of the timber sale volume. Site preparation projects were completed by such organizations as the Youth Conservation Corps (YCC) and the Young Adult Conservation Corps (YACC). There were few appropriations for such projects. Emphasis was on timber sales that used temporary access and left little opportunity for any real timber management.

The TPCC inventory and management framework plans were not done before 1978. The timber production base was calculated from the 1974 extensive inventory using percentage reductions for multiple-use restrictions and land capability. The timber production base would be 54,247 acres with a 10-year allowable cut of 78 million board feet. At the end of about 10 decades, the cut would be modulated upward as a good age distribution is obtained and growing stock levels are improved.

Limited Investment

The limited investment alternative is essentially a wildland condition. This alternative emphasizes timber sale revenues without such treatments as thinnings, stand conversions, or site preparation. Plantings, following harvesting operations, would be the only treatment the land would receive for timber production.

All operating measures regarding yarding, harvest methods, and buffer strips would be the same as the proposed action. No herbicides or fertilizers would be used.

The timber production base would be based on the TPCC inventory and MFP withdrawals. The base of 48,682 acres would be the same as the proposed action. The 10-year allowable cut would be 65 MMBF. The cut would be modulated upward as a good age class distribution is obtained and growing stock levels improved.

Accelerated Harvest

The Bureau planning process and the scoping process for SYU 13's timber management environmental impact statement identified the concern of the regional timber industry for availability of additional public timber.

The regional timber industry has indicated that, because of widespread and extensive harvesting on private forest lands in the 1950s and the 1960s, a lag is developing between existing old-growth reserves and the availability of second-growth timber. The timber industry has estimated that this lag could affect timber supplies to mills in the region for the next two to three decades. In the interim, industry stated that an increase in availability of timber from public forest lands could help alleviate this deficiency in supply. Consequently, the Ukiah District staff developed two scenarios for an accelerated harvest alternative. Each were developed to meet the following criteria:

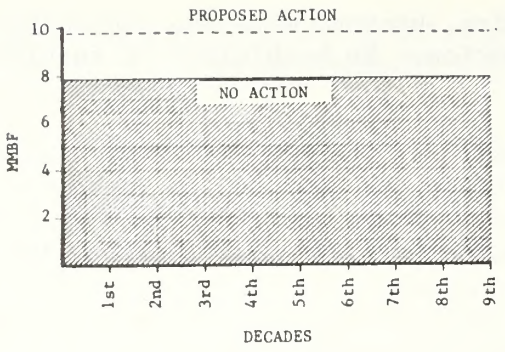
- To accelerate harvest enough to be useful in assisting local industries alleviate their predicted supply deficiency.

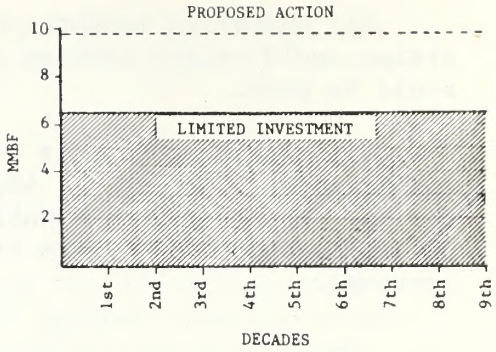
- To be conservative enough to allow implementation.

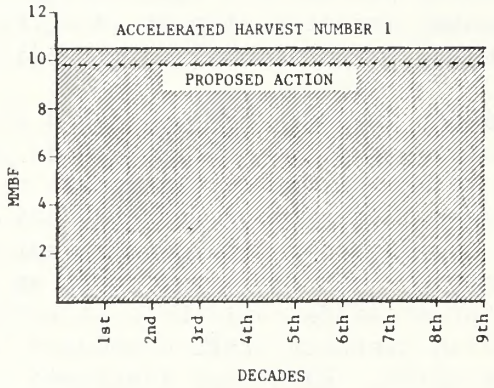
- To adhere to FLPMA's direction to manage the resource in accordance with multiple-use and sustained-yield principles.

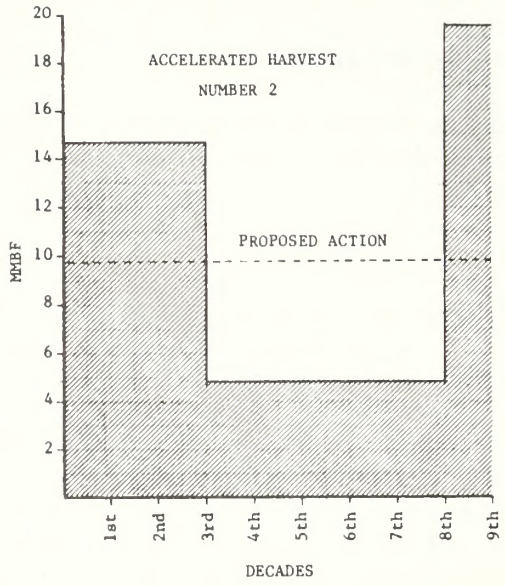
ACCELERATED HARVEST #1

Accelerated harvest #1 allows an adjustment to an accelerated harvest without a subsequent drop in harvest levels by shortening the minimum harvest age to 70 years and cutting the standing volume in a shorter period of time (Figure 2-3). Accelerated harvest #1 would increase the 10-year allowable cut to 105 million board feet for a period of 70 years. This alternative would bring the forest into regulation more quickly than the proposed action but would sacrifice some growth by cutting in immature age classes during the seventh and eighth decades. Subsequent cutting must be modulated sharply upward because of increased growing stock and better age class distribution.









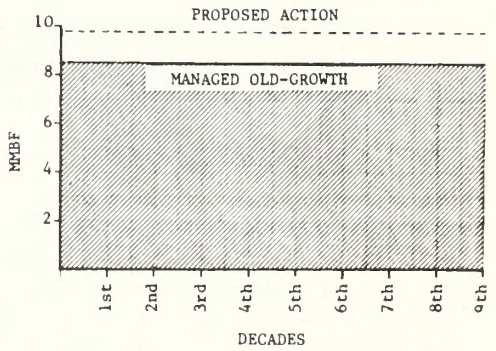


FIGURE 2-3 Comparison of allowable cuts, proposed action and alternatives.

ACCELERATED HARVEST #2

Accelerated harvest #2 (Figure 2-3) would: (1) increase the 10-year allowable cut to 146 million board feet for a period of 30 years, (2) decrease the 10-year allowable cut to 50 million board feet for the next 50 years, and (3) increase the 10-year allowable cut to approximately 200 million board feet as the forest approaches regulation with increased growing stock and better age class distribution.

The parameters and timber production base for the accelerated harvest alternatives are the same as the proposed action.

Managed Old-Growth

Research (Franklin et al. 1979) indicates that old-growth forests are ecosystems with elements critical for maintaining forest and stream productivity and health. These structural elements are (1) large trees, (2) large snags, (3) large woody debris on the forest floor, and (4) large woody debris in headwater streams.

In order to maintain long-term site productivity, recruit snags for future wildlife needs, and provide limited large sawlogs and veneer for future markets, a scenario for managed old-growth stands is offered as an alternative to the proposed action.

The parameters included in the proposed action are the same for this alternative, except gross yarding. Gross yarding of down material would not generally be done. To improve plantability, spot burning of exceptionally dense slash is preferred in this alternative. The intent is to leave as much large litter as possible on the site. The elements of the scenario are:

1. The rotation age for Douglas-fir and associated conifers would be 100 years. Hardwoods would be carried as a coppice (originating from sprouts) and clearcut at every stand entry except the third.

2. A two-stage shelterwood regeneration system would be employed. Half the volume or basal area of 100-year-old trees would be retained as overwood until age 115.

3. Precommercial thinning would occur simultaneously with overwood removal as soon as sufficient regeneration is established (about 15 years after the seed cut).

4. The 400 stems normally left after precommercial thinning (Reukema and Bruce 1977) would be reduced to 360 to allow 10 percent of the acreage to be occupied by superdominants, when present.

5. Commerical thinning would be done at stand ages 38, 51, and 69.

6. At the time of precommercial thinning and overwood removal (15-year-old and 115-year-old trees, respectively), approximately 20 percent of the overwood stems would be recruited as superdominants and carried for an additional 85 years to an age of 200 years. The retention of these scattered superdominants, supported by approximately 10 percent of the growing capacity of the site, is the only major deviation from a modern concept of intensive management. Approximately twelve 18 to 20-inch diameter trees per acre would be recruited as superdominants and allowed to develop old-growth characteristics.

7. During the period between 115 and 200 years, some superdominants would naturally convert to snags and down logs. At 200 years, additional snags and down logs would be recruited from the superdominants. Half of the superdominant volume at age 200 would be available for commercial extraction; the remainder would be invested in the site.

The timber production base is 48,682 acres with a 10-year calculated cut of 85 MMBF. Due to the difficulty of the SIMIX model estimating a yield for this alternative and lack of Bureau experience in accurately predicting future yields under the conditions imposed by this alternative, the estimated harvest level was calculated by hand.

If this alternative is chosen in the record of decision, the Bureau will ask the Denver Service Center to refine the estimated harvest level and make long-range projections.

Table 2-2 compares the discrete actions and Table 2-3 compares the cost of implementation of the proposal and alternatives.

FUTURE FOREST

The wood output from a forest depends on the amount of land devoted to wood production and the growth of trees on that land. These are influenced by land tenure and use, wood utilization, and forest management practices, which must be identified and quantified to determine their effect on the productivity of the forest. In doing so, the uncertainties of the future must be estimated, as well as the relative certainties of the present.

The most influential determinant of the allowable cut for commercial forest land is the rate of wood growth that the forest may be expected to produce in the future. The annual allowable cut for regulated forests is equal to its annual net growth. Under the concept of even flow, the maximum

TABLE 2-2
COMPARISON OF ALTERNATIVES
DISCRETE ACTIONS

PER DECADE	PROPOSED ACTION	NO ACTION	LIMITED INVESTMENT	ACCELERATED HARVEST #1	ACCELERATED HARVEST #2	MANAGED OLD GROWTH
Timber Production Base (Acres)	48,682	54,247	48,682	48,682	48,682	48,682
Allowable Cut (MMBF, Scribner)	97	78	65	105	146	85
Road Construction (Miles)	57	43	36	57	79	49
Reconstruction (Miles)	94	90	79	100	140	90
Tractor Yarding (Acres)	1,613	1,377	1,144	1,757	2,467	1,396
Tractor Yarding (MMBF)	36.0	31.8	26.4	37.5	52.5	32.8
Cable Yarding (Acres)	2,607	1,975	1,640	2,817	3,954	2,161
Cable Yarding (MMBF)	61.0	46.2	38.6	67.5	93.5	52.2
Slash Disposal (Acres)	1,212	1,086	902	1,212	1,701	1,118
Slash Disposal (Tons)	27,693	21,464	17,832	27,693	38,875	21,853
Acres To Be Planted	2,203	1,012	843	2,307	3,027	1,884
Precommercial Thinnings (Acres)	443	0	0	443	664	443
Site Conversion (Acres)	483	22	0	483	645	455
Timber Stand Improvement (Acres)	323	70	0	323	489	327
Grass/Animal Control (Acres)	135	0	0	135	135	135
Fertilization (Acres)	75	0	0	75	75	75
Seed Production Area (Acres)	10	0	0	10	10	10
Acres Out Of Production Due To Roads	199	160	129	215	299	176
Buffer Strips (Acres)	308	235	196	336	472	248

TABLE 2-3
COMPARISON OF ALTERNATIVES

ESTIMATED COST OF IMPLEMENTATION
(1980 Dollars)

	Proposed Action	No Action	Limited Investment	Accelerated Harvest #1	Accelerated Harvest #2	Managed Old-Growth
Access Acquisition						
WM	200	163	133	200	288	183
Contract Costs	$636,000	$516,750	$421,350	$636,000	$914,250	$578,475
Timber Sales						
WM	1,003	780	650	1,050	1,460	845
Engineering/Const.						
WM	60	41	34	65	75	50
Contract Costs	$12,690,000	$10,060,000	$8,595,000	$13,747,500	$17,360,000	$11,390,000
Forest Development Planting						
WM	40	18	15	42	55	33
Contract Costs	$273,674	$118,800	$99,000	$287,358	$355,400	$208,286
Site Conversion						
WM	16	2	-	16	20	16
Contract Costs	$71,104	$3,000	-	$71,104	$92,900	$71,104
Timber Stand Improvement						
WM	14	2	-	14	19	14
Contracts Costs	$11,911	$1,800	-	$11,911	$15,900	$11,911
Stocking Surveys						
WM	19	8	7	20	26	17
TOTAL WM	1,352	1,014	839	1,396	1,943	1,158
TOTAL CONTRACT COST	$13,682,689	$10,700,350	$9,115,350	$14,753,873	$18,738,450	$12,259,776

wood growth of the regulated forest fixes the maximum allowable cut of both the present and future forest. However, the allowable cut during the time needed to convert an unregulated forest to a regulated condition can be less than the future maximum.

The forests in SYU 13 are essentially wild forests producing far below their projected potential of approximately 20 million board feet per year under the parameters of the proposed action. The estimated harvest levels of the proposed action and alternatives are levels necessary to carry existing growing stock to the critical point, when young stands reach merchantable size. For all of the alternatives, this is around the eighth and tenth decades, due to the lack of intermediate age classes. After the critical point is reached, the harvest levels for all alternatives would be modulated upward (not equally) because of rapid ingrowth to merchantable size on many forest acres. More than one rotation would be necessary to achieve a good age class distribution and the desired growing stock levels. Until that time, the minimum harvest age projected in each alternative and the proposed action would rarely be reached. Harvesting would be done in older age classes.

MITIGATION

Mitigation measures identified and committed as a result of this analysis are components of the proposal and alternatives (Table 2-4). Other possible mitigation measures are included at the end of Chapter 4.

TABLE 2-4

MITIGATION IDENTIFIED AND COMMITTED AS A RESULT OF ANALYSIS

COMMENTS	MITIGATION
Soils/Watershed	Soils/Watershed
Studies have shown that ridge roads experience minor erosion, whereas roads on the upper one-third slope have seven times as much erosion and roads on the lower one-third slope have ten times as much erosion (Rice 1979b, Anderson no date). The worst location for increased sediment is along streams. Upgrading or improving streamside roads would cause even more of an increase in sedimentation.	Preferred road locations will be on ridgetops and on the upper one-third of the slope.
The amount of erosion (mostly mass wasting) associated with roads increases with the slope of the terrain that the road traverses. Roads built on slopes over 60 percent experience up to 70 percent more erosion than those on flatter slopes (Rice 1979b and Dodge 1976).	Roads will not be built on slopes in excess of 60 percent.
It has been estimated that 50 to 95 percent of the soil eroded from a logged area is eroded within 2 years after completion of harvesting operations. Therefore, it is extremely important that erosion control facilities be maintained during this period (Dodge 1976).	Mainline roads will be maintained at least annually, and more often if warranted. Waterbars and drainage structures on spur roads will be maintained for two years after construction. Rolling grade dips will be constructed and maintained where necessary on mainline and spur roads.
Stabilization of the road surface and improved drainage reduces erosion from surface runoff. The steeper the grade, the more important rocking becomes.	Main haul roads will be rocked to a moderate depth if used year-round. Alternative: roads will be closed to all traffic, including BLM, during the rainy season.
Better design or modification of alignment can reduce mass wasting by 10 percent or more (Rice 1979b).	Geotechnical investigations will be conducted on proposed road locations far enough in advance of construction that major realignment can be surveyed and investigated.
Ripping of skid trails improves plant growth and reduces surface runoff. The need for ripping should be determined prior to treatment and not done as routine. Care should be exercised to prevent further compaction and root damage from the ripping treatment. Skid trails should be ripped during the season when the soils are the driest.	Skid trails will be ripped when needed to improve soil structure.
Less soil will be exposed to raindrop splash erosion and overland flow. Skid trails will not become drainageways into the stream channels.	No excavation will normally be permitted for skid trails.
High ground pressures of 20 to 28 psi exerted by rubber-tired skidders can cause long-term soil compaction problems. On the other hand, crawler tractors exert 6 to 13 psi and the FMC skidder about 5.5 psi, so compaction can be substantially reduced (Froehlich 1979).	Rubber-tired skidders will be prohibited except as swing machines on permanent mainline and spur roads.
Protection of active slides from tractor or road entry will reduce severity and speed of mass movement.	There will be a 100-foot buffer zone around active slides. Actual tractor or road entry will be prohibited within this zone. No logging will be done in the slide area and buffer zone, but downed trees can be salvaged by end-lining from outside the buffer zone.
Road construction through areas of inactive slides could result in accelerated erosion and increased road maintenance.	Inactive slides will not be undercut by roads.
Where there is sufficient deflection, overhead cable yarding is less damaging then tractor skidding or high-lead ground yarding logs to landings. To get deflection, it could be necessary to cross a creek or canyon to obtain a tailhold on the opposite slope, or there could be logs on the opposite slope that must be removed. The tailhold must be made high enough that excessive soil disturbance does not occur within or directly above the creek buffer zone. This allows full suspension of logs crossing the buffer zone.	Cable yarding across streams will be permitted only if sufficient deflection is available on the yarding corridor to fully suspend logs. Sufficient deflection will be provided to prevent flown logs from hitting the edge of a bench or bluff directly above the creek bank.
Disturbance in the ephemeral channels and drainages is a major cause of erosion and sedimentation.	With the exception of road construction equipment, tractors and other machinery will not be permitted to operate within 30 feet of ephemeral channels and drainage areas. Merchantable trees may be harvested in this zone by directional falling techniques, but nonmerchantable vegetation will be left essentially intact. Hardwood control by hand and replanting may be done to maintain a productive timber site. When necessary, yarding across channels will be done only in dry weather and perpendicular to the channel.

COMMENTS	MITIGATION
Soils/Watershed (Continued)	Soils/Watershed (Continued)
Two major sources of stream sedimentation are washing of dust-coated roadside vegetation and washing and erosion of road surface material. Road oiling is a low cost control of this sediment washing. Successive re-application on continuous use roads will set up the surface material and reduce sediment for a longer period of time.	Road oiling using the proper formulation and successive reapplications will be done on continuous use roads.
Vegetation	Vegetation
BLM must supply its own seed to the nursery. Due to fires and past logging, good seed sources in some areas are difficult to locate and utilize. Numerous seed sources are needed to ensure genetic diversity and seeds best adapted to the site.	BLM will establish at least one seed production area for every seed zone and appropriate elevation zone.
Wildlife	Wildlife
Snags:	
After commitment of a forest tract to intensive timber management, the provisions of snags are one of the most important considerations for the retention of forest species.	Where present, BLM will provide and maintain an average of 5-6 hard snags per acre (where feasible additional snags should be provided).
Recommendations are based on the needs of the most common and widespread primary cavity users observed in the SYU during 1978 field inventories. Various references were consulted (Bull 1978, Thomas 1979, USFS 1979b, and CDFG no date).	- Approximately one-half of all snags retained should exceed 21" in diameter and preferably be over 45' in height. While large snags are preferred, advantage should be taken of any snags, particularly during initial harvest and early implementation of snag retention programs.
The potential 6 snags per acre resulting from the six leave trees as explained in the managed old-growth alternative would eventually result in a high degree of retention of cavity users throughout the SYU. For this alternative to be of immediate benefit to wildlife, provisions should be made to provide these snags upon initiation of this management alternative.	- Snags can be left in small groups or singles to take advantage of existing snags. As snag management proceeds, it is desirable to distribute snags throughout the area. Overall, it is somewhat more desirable to leave proportionally more snags in the proximity of forest edges and streams.
	- Where choice is possible, ponderosa pine is a preferred species for snag retention.
The reason so many snags are necessary is, for every snag suitable (various sizes and stages of deterioration) for cavity nesters, up to 15 may not be suitable (Bull 1978). However, most snags are used for perching and feeding by birds and will eventually be used as downed log habitat by a host of forest wildlife.	- All possible efforts will be made to meet snag requirements upon initial timber harvest entry. In some cases this may require leaving a safety zone (a radius of the length of the snag) around its base to protect workers. (See glossary for snag definition.)
Downed Logs and Debris:	
It is known that logs and forest debris provide habitat for a wide variety of wildlife and are important to the long term health of the forest environment (Franklin et al. 1979)	BLM will leave a minimum of 6 downed logs per acre (Thomas 1979). Additional logs are desirable.
At present there is no known scientific basis for predicting optimum amounts of logs and debris.	- When harvesting a stand, all presently occurring downed logs will be left in place. If an impassable jumble of logs is present, some can be scattered and, if necessary, removed.
It is known that a variety of logs in various stages of decay are desirable (Thomas 1979).	- Where the minimum number of logs does not occur, unmerchantable sections of cut cull trees will be left in place or brush piles can be substituted until downed logs can be recruited.
	- Uncharred logs are preferred since charring hardens the surface and slows decomposition, making them less valuable to wildlife. In this regard, broadcast burning of large acres of the forest floor will be discouraged.
	- It is desirable to maintain a variety of logs in various stages of decomposition, and orientation along contour lines is preferred (Thomas 1979).
	- The most desirable logs are at least 17" in diameter and 20' in length.

COMMENTS	MITIGATION
Wildlife (Continued)	Wildlife (Continued)
Hardwood (Broad-Leaved) Tree Retention:	
While it is implied that all broad-leaved trees and shrubs could not be removed during timber stand improvement a more conscious approach to size, number, and distribution should be required to provide plant species and canopy diversity. There are no known criteria for determining acceptable levels of broad-leaved tree retention at this time.	BLM will retain and maintain a minimum of five mature broad-leaved trees per acre and the same number of younger replacement trees. - Species retained will be representative of natural vegetation occurring on the site; however certain plants have greater value for wildlife than others. One such example is black oak (Quercus kelloggii). - Broad-leaved tree retention and recruitment recommendations will be made on a case-by-case basis by a wildlife biologist.
Protection of Seeps, Springs, Ponds, and Meadows:	
Seeps and springs are important to wildlife and should receive protection similar to streams. Meadows and forest edges contribute to overall forest habitat diversity and many species require these habitats in close proximity to one another. Naturally occurring wet meadows are especially important. The relatively small size of most timber stands makes the protection of meadows difficult.	Springs and seeps will be protected by 75' of undisturbed zones. Natural meadows will be protected by a minimum 75' buffer zone (measured horizontally). Final width recommendation will depend on density of the stand and other site specific criteria. A selective harvest may be permitted; however a minimum canopy cover of 50% will remain, and no more than half of the trees with dbh of 21" will be removed. All snags will be retained. The integrity of meadows will not be altered by timber harvest activities, including operation of machinery, falling, yarding, road construction, etc. If on a particular site it is believed that a 75' buffer zone would result in excessive damage from windthrow, the zone will be expanded or cutting will not occur.
Stand Management:	
Because of the overall small size of timber stands, it is difficult to manage for various stages of succession and thereby provide a continuum of all stages of succession in a local area. Legal difficulty and cost of access to Federal tracts compounds the problem. Consequently, timber harvest proposals are relatively large with frequent entry and would result in much of a timber stand area in one stage of succession. Steps should be taken to retain and/or provide mature and old-growth forest in all harvest areas. This would involve long term planning. An aspect of a multi-layered canopy should be retained. Maintaining scattered broad-leaved trees and super-dominants would fulfill part of this requirement. A greater size and variety of conifers should also be considered.	A minimum of 20 acres of mature and/or old-growth forest will be retained in each harvest area. This is especially important where the harvest block is relatively small and contains all or most of the remaining mature timber in an area. Additional area may be required where sensitive species are involved. Attempts will be made to reduce the size of harvest area and stagger cutting cycles to provide a continuum of forest successional stages through long-term planning.
Sensitive Species:	
Spotted Owl If suitable old-growth reserves are not provided, spotted owl habitat can be preserved on a case-by-case basis. These areas would also provide habitat for a great variety of forest dependent species.	Approximately 300 acres, or where available more, will be provided for each pair of spotted owls. There have been 15 observations of this species as noted in Chapter 3 on public lands in SYU 13. If further inventory of these areas identifies them to be nesting sites, approximately 4,500 acres or 9.24 percent of the available productive forest land base would be deferred from forest management activities for an undeterminable period. Less area may be

COMMENTS	MITIGATION
Wildlife (Continued)	Wildlife (Continued)
Sensitive Species: (Continued)	provided where habitat use occurs in part on land in other ownership and can be preserved through cooperative effort (i.e., this would primarily involve the Nature Conservancy's North Coast Preserve and the U.S. Forest Service). Land classified as nonproductive forest can be incorporated if it provides suitable habitat. BLM will monitor known spotted owl areas every two years. Acres set aside for owls include the following: - the nest site or grove - the permanent water course closest to the nest area - where suitable, the hillside from drainage area to ridgetop. Mitigation recommendations for the SYU are adapted from Jackman and Scott 1975 and contain information from Nietro 1974 and Gould 1974. Much of the information is also contained in Zarn 1974.
Red-legged Frog Little suitable habitat anticipated on SYU land for this species.	If encountered, additional habitat protection may require the expansion of aquatic buffer zones to 200 feet and special precautions in logging the surrounding area (e.g., suspended cable yarding).
California Mountain King Snake Anticipated but not yet encountered on SYU lands.	Proposed buffer zones and downed log recommendations will provide a high degree of habitat protection for this species. No other mitigation proposed at this time.
Osprey No nesting sites known on SYU lands. Minor feeding use could occur on or adjacent to BLM timber stands.	If encountered on BLM land, nest sites will be protected by a no cut zone 600 feet in diameter (Jackman and Scott 1975). A one-half mile no disturbance zone will be imposed around the nest from February through August.
River Otter Permanent habitat expected to be very limited on SYU lands.	Where encountered, proposed buffer zone will be expanded to 200 feet and special logging methods imposed to reduce land disturbance.
Ringtail Because of habitat preference and proposed buffer zones, very little impact is anticipated.	No further mitigation proposed at this time.
Mountain Lion Due to large territory size and habitat preference, little impact is anticipated.	Any denning areas encountered will be protected from human disturbance by rerouting roads and other measures to reduce human disturbance. Bobcats will receive the same consideration as the mountain lion.
Other Species Requiring Spceial Protection:	
Goshawk This species occurs in low densities with suitable habitat rapidly being lost. If encountered outside of a sizable reserve area, special habitat protection is necessary.	An undisturbed area of a minimum of 40 acres will be maintained around the nest site. Long term planning should provide for maintaining suitable nesting habitat in the area for the future. As much north facing slope should be included as possible (Jackman and Scott 1975). Ultimate size will depend on the amount of forest in the area. No timber harvest operations will occur within one-half mile of the nest site from March through August (USFS 1979b). There have been 3 observations of this species as noted in Chapter 3 on public lands in SYU 13. If further inventory results in identification of definite nest sites, approximately 120 acres or 0.2 percent of the available productive forest land base would be deferred from forest management activities for an undeterminable period.

COMMENTS	MITIGATION
Wildlife (Continued)	Wildlife (Continued)
Roads:	
Road crossings of streams should be discouraged. Often the major cause of stream degradation can be attributed to roads.	Where stream crossings are absolutely necessary, the road will be constructed in such a manner so as to reduce the amount of streamside area involved to a minimum. This would involve an attempt to cross the stream and its buffer zone at a right angle.
Streamside zones are also extremely valuable to the widest variety of wildlife in an area (Bull 1978 and Thomas 1979).	Roads and skid trails will not parallel buffer zones.
Timber Sale Inventory:	
Timber sale inventory by a qualified biologist is necessary if meaningful site-specific mitigation is to occur and for compliance with various laws and directives (e.g., Endangered Species Act 1973, amended 1978 and 1979).	Each proposed timber sale and road network will be inventoried by a wildlife biologist at an early stage of planning. Biologists from other agencies (e.g., CDFG, USFWS) will be asked to participate in sale area inspection and recommend mitigation. Special effort will be made to determine if suitable habitat is present for other low density species, including pine marten, fisher, red tree mouse and flamulated owl.
Cultural/Sociocultural	Cultural/Sociocultural
Avoidance is the preferred method for the protection of prehistoric and historic sites. Sites must be protected from vandalism and inadvertent destruction.	Mitigation will include: Signing- Under conditions of active or potential vandalism, cultural resources will be adequately signed, identifying the protection afforded by law. Care will be taken to ensure that signs are placed in a manner not to intrude upon the values of the site or to draw attention to the resource. Fencing/Gating - According to the control and preventive measures desired, fences, barriers, railings and gates can be used alone or in combination for restrictable access. In some cases it may be necessary to selectively exclude access to portions of the cultural resource. As with other on-site physical measures, care will be taken not to damage or intrude upon more values than are protected. There are different kinds of fences, barriers, railings and gates and different materials that can be used. The planned design and materials will avoid unwarranted intrusion on the site. In the design of barriers, maintenance requirements and safety will be considered. Patrolling/Surveillance - Patrols and inspections will be determined by the fragility of resource, degree of threat present, and the use and importance of the cultural resource. Where possible, fragile and accessible cultural resources will be visited and inspected frequently. The visit will result in a report documenting the status of the resource. The report will be evaluated by local, State and Federal agencies and other interested parties. Irregularly scheduled patrols are one of the best means of preventing pothunting, vandalism and other unauthorized use. Patrolling requires careful planning and timing to be effective.

COMMENTS	MITIGATION
Cultural/Sociocultural (Continued)	Cultural/Sociocultural (Continued)
	Erosion Control - Cultural resources are frequently threatened by various types of erosion. Patrols and inspection surveys will monitor erosion. Checks will be made at water levels, major runoff areas, and where other potential erosion problems exist. Adequate drainage will be provided to prevent damage to resources. Catch basins, diversion dams, and other protection measures can be constructed to reduce erosion and protect the cultural resource. Erosion control should always be performed off-site.
	Class III Inventory (Cultural resource sites): Four prehistoric sites are located on a tract of BLM land included in the 10-year plan. The Bureau will withdraw approximately 200 acres of the tract from the timber base to protect these sites. The remaining 7 sites will be protected by 200-foot buffer zones.
Good planning is necessary to inventory and protect sociocultural sites far in advance of proposed activities on public land.	The Bureau will design protective programs, complete compliance requirements, and implement preservation programs at least 1 year in advance of any timber sale or other timber management related activities. Each year the Bureau will complete cultural resource inventories for the tenth year timber sales. To determine the effectiveness of the proposed protection measures, the Bureau will develop and implement a monitoring program for each site recorded within the SYU 13 study area. A specific site map will be prepared and permanent photographic points will be established. If it is determined that sites are either directly or indirectly impacted by timber management activities or any other activities, i.e., recreation, the Bureau will reassess this protective program and will immediately initiate efforts to implement more effective measures.
Access to and road building on public land may encourage timber management activities or other site disturbances on adjacent private land.	If cultural resources are known to exist on private lands adjacent to BLM lands, the Bureau will encourage the private party to preserve and protect the prehistoric and/or historic sites.

3

AFFECTED ENVIRONMENT

CHAPTER 3

AFFECTED ENVIRONMENT

Chapter 3 discusses the components of the environment (including the social environment) of Sustained Yield Unit 13 (SYU 13) that would be affected by the proposal and alternatives. This is a general description of the existing environment to provide background for understanding the effects of the proposal and alternatives discussed in Chapter 4. Emphasis is given to those components of the environment that would be most affected.

CLIMATE

The climate of the SYU 13 area is Mediterranean with warm, dry summers and mild, wet winters. Temperatures range from 10° to 110°F at inland points and from 20° to 90°F at coastal locations. The Pacific Ocean modifies coastal areas with fog and cool breezes.

Rainfall totals range from 25 inches in southern portions of the unit to 120 inches at northern coastal points. Most of the precipitation falls as rain during the winter months. Snow occasionally falls at all elevations and is heaviest at the higher elevations of the more northerly portions of the sustained yield unit.

AIR QUALITY

The entire sustained yield unit lies within the North Coast air basin. Air quality is well within Federal and State standards. The prevailing winds are continually active off the Pacific Ocean from the northwest. Microclimatic temperature inversions do occur, however, and result in short periods of air stagnation. Eureka is the only smoke-sensitive area in the unit.

NOISE

Ambient noise is the all-encompassing noise within a given environment. Although no noise level surveys have been conducted within the region, other data from similar areas of nonpopulated woodland environment indicate that the maximum ambient levels average from 35 to 40 decibels, measured on the A Scale (dBA). This is in the faint to moderate range of human hearing (AMF 1971). At the bank of a small stream the noise level is approximately 45 dBA. Public and private lands within the region are used for timber production and the noises attributable to timber harvesting include the sounds produced by chainsaws, skidders, tractors, yarders, log trucks and other vehicles, as well as human voices. Chainsaws and skidders produce from 74 to 96 dBA at 50 feet and can be heard 50 percent of the time at a distance of 1.5 miles or further, depending on topographic and atmospheric conditions (Harrison 1974).

GEOLOGY AND TOPOGRAPHY

The majority of the lands in SYU 13 lie within the northern California Coast Ranges geomorphic province and, to a lesser degree, within the Klamath Mountains geomorphic province. The physiography is diverse, ranging from flat tablelands in the several large structural valleys to rugged mountains with many separate ranges and coalescing masses. Elevations vary from near sea level to 6,000 feet in the northern California Coast Ranges and up to nearly 9,000 feet in the Klamath Mountains.

Rocks typically found in the northern California Coast Ranges vary in age from the Late Jurassic period to the Recent Epoch. The predominant rock types are marine sedimentary rocks of the Franciscan Assemblage, which contain an abundance of sheared rock characterized by high clay content, low permeability, and high susceptibility to landsliding.

The San Andreas and numerous less-publicized faults traverse the area and sometimes trigger slides and disrupt various activities of man.

The drainage pattern is generally from east to west in the Klamath Mountains and is mainly dendritic (irregular, branching in all directions). With some exceptions, streams and rivers flow transverse to structure and lithology in deep, narrow canyons. Major rivers of the Klamath Mountains province include the Klamath and the Smith.

By contrast, elevations are generally lower in the northern California Coast Ranges. The drainage is mainly toward the northwest and approximately parallel to the structure and lithology. (An exception to this is the Russian River, which flows southeast.) Major rivers of the California Coast Ranges province include the Van Duzen, Eel, Mad, and Russian.

To date, there have been no antiquity permits issued in the Ukiah District, and there have been no inquiries regarding such resources. There are numerous literature references to fossil collecting sites on or adjacent to public lands within the study area. However, such collections were made for scientific purposes only, as a means of dating or identifying lithologic units encountered. The collections included invertebrate fossils of common variety, and there have been no documented finds of vertebrate fossils. Also, there are no known areas of unique fossil occurrence in SYU 13 that would come under the purview of the Antiquities Act. There are no documented finds of unique fossilization (i.e., museum quality, vertebrate fossils, one-of-a-kind, rare with limited areal outcrop extent or surface exposure, or of scientific interest) other than fossils collected to date or identify the rock that they came from.

SOILS

The forest soils of SYU 13 occur on moderately steep to very steep slopes on mountainous terrain. They are divided by many major and minor drainages. Most of the soils have 1 to 2 inches of litter and are 30 to 60 inches deep over fractured, hard sandstone or shale. They are well drained, permeable clay loams with a high percentage of rock fragments within their profiles. Water holding capacity is moderate to high, depending mainly on soil depth. Appendix 3-1 lists the major soils of SYU 13 and their properties and interpretations.

When undisturbed, the forest soils are relatively stable and show little or no evidence of erosion. They are protected from erosion by vegetation, nonliving organic matter, and rock. The cover absorbs the erosive energy of raindrop impact, and surface obstructions slow down overland flow of water and sediment. Water infiltration, increase of soil shear strength, drainage, soil aggregate stability, and soil fertility are all improved by living plant roots (Hauge and Euphrat 1979).

In the natural undisturbed forest, bare soil is relatively rare, especially under the humid coastal climate. However, once soil is bare, it tends to erode and has a high to very high erosion hazard. Vegetation establishment is discouraged and much of the soil remains bare and susceptible to further erosion. Actively eroding areas, such as road banks, landslide scarps, and

gullies, tend to remain bare. Bare areas that remain relatively stable for a period of time are soon revegetated by plants that tolerate adverse growing conditions.

Since forest soils are steep, gravity is an important source of erosional energy. Sandy soil under dry conditions can move downhill under the force of gravity alone. When the soils are saturated, soil creep may occur, culminating in landslides. Because soils are commonly uneven, flowing water is quickly channeled into rills and gullies. As a result, eroded material includes a large proportion of the less fertile subsoils and parent materials (Rice 1979a).

Forested sites within SYU 13 range from robust to extremely fragile and from areas of rapid recovery to those slow to recover (Rice 1979a). The timber production capability classification (TPCC) inventory eliminated major soil areas from the productive timber base that are marginal for timber production and slow to recover. These included serpentine soils, shallow soils, and known unstable soil areas. The remaining soils are productive, fertile, and capable of sustained timber yield and are considered in this environmental impact statement.

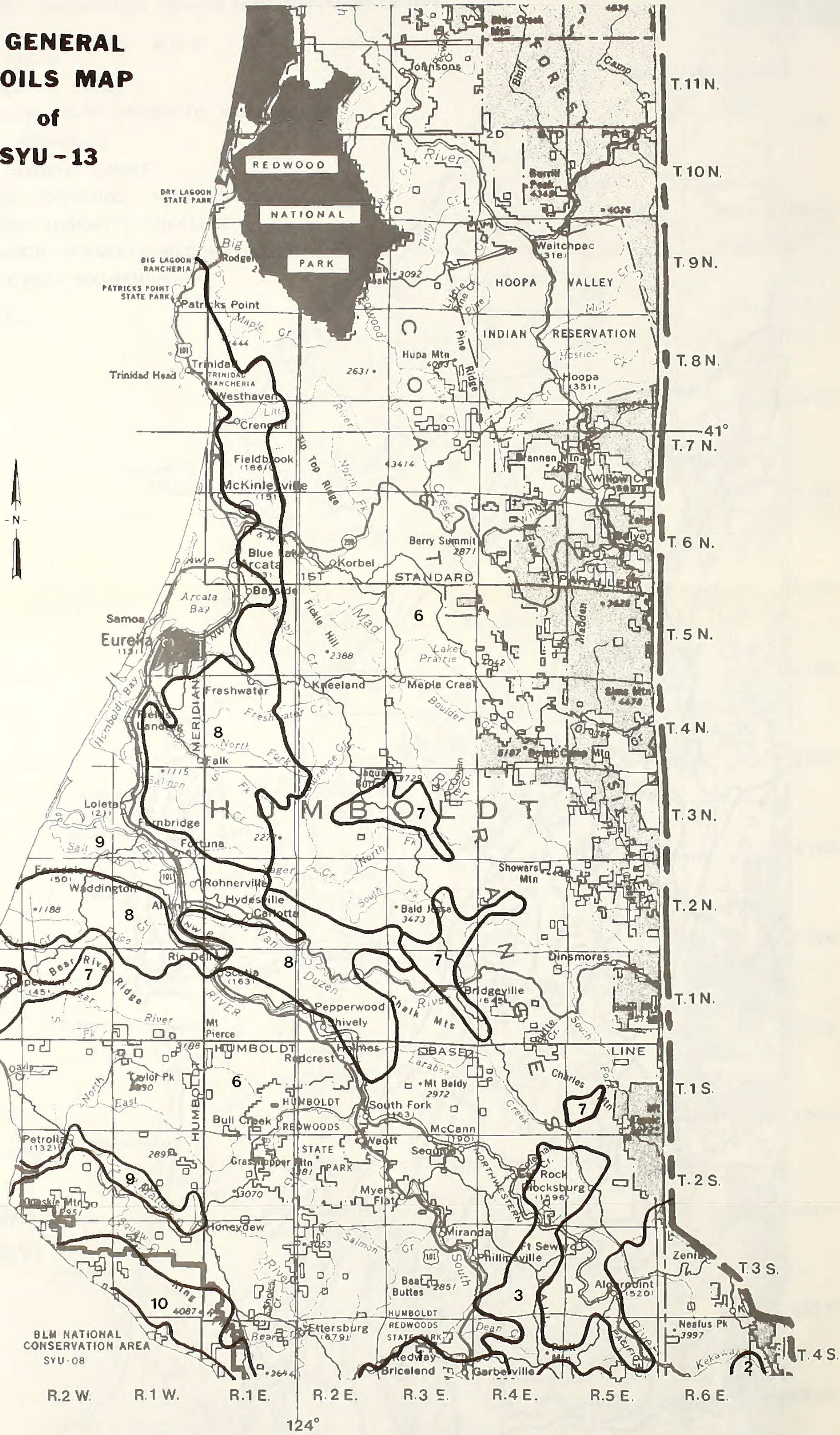
Map 3-1 is a general soils map of SYU 13. The information for Mendocino County is from an intensive soil survey currently being done by the Soil Conservation Service (SCS). Because the same information is not available for Humboldt County, there are dissimilarities on the map between the two counties. The SCS is currently mapping 23 different forest soils in Mendocino County with the possibility of finding additional soils as mapping progresses. The SCS will complete the soil surveys for Mendocino County in 1980 and Trinity County in 1981.

Most of the forest soils in Humboldt County are shown on the map as the Hugo-Josephine association. This broad group of soils will be further divided when more soil inventory work is completed. There are no definite plans by the SCS to do a soil survey in Humboldt County. In the meantime, BLM will continue to do intensive soil inventories of the forest lands under its management.

WATER

The watersheds in SYU 13 lie mainly in five major North Coast river basins. They are, from north to south, the Klamath-Trinity, Mad, Eel-Van Duzen, Mattole, and Russian. All are tributary to the Pacific Ocean.

GENERAL SOILS MAP of SYU-13



LEGEND:

1 CASABONNE - MAYMEN - WHOLEY

2 SHEETIRON - PLASKETT - MADONNA - ASSOCIATION

3 HOPLAND - YORKVILLE - YORKTREE

6 HUGO - JOSEPHINE

7 YORKVILLE ASSOCIATION

8 LARABEE ASSOCIATION

9 FERNDALE - BAYSIDE - HOOKTON ASSOCIATION

10 COLLUVIAL LAND - LANDSLIDE ASSOCIATION

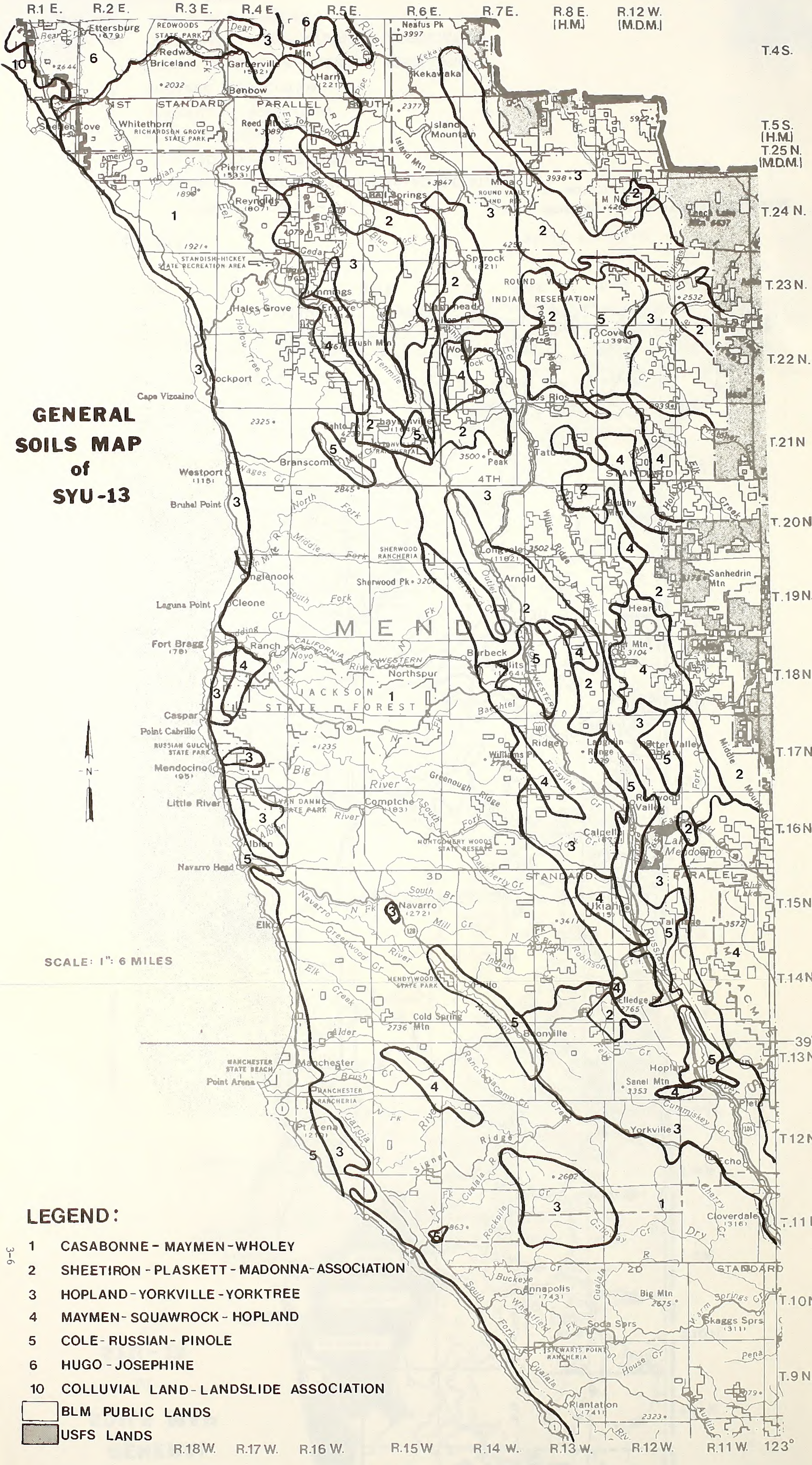
BLM PUBLIC LANDS

USFS LANDS

SCALE: 1": 6 MILES

SOURCE: UNITED STATES DEPARTMENT OF AGRICULTURE 1972

MAP 3-1 (NORTH)



SOURCE: SOIL CONSERVATION SERVICE (PRELIMINARY SOILS MAP)

MAP 3-1 (SOUTH)

Only three major reservoirs exist in SYU 13: (1) Lake Pillsbury on the Eel River diverts water via (2) Scotts Diversion Dam through the Potter Valley powerhouse tunnel to (3) Lake Mendocino, on the East Fork Russian River.

WATER YIELD

Timber harvest in the surrounding areas has generally increased the amount of water available for runoff, which allows more year-long flow, adds to the fishery habitat, and increases the base flow during the dry season or drought year. Under north coastal conditions, this increased yield does not add significantly to flood peaks. Water yield is strongly influenced by the amount of precipitation, as well as soil depth, slope, aspect, and rock, soil and vegetation type.

Water yield may occur as both surface flow, with a resulting sacrifice to water quality, and as a channel spring from a groundwater flownet, where percolating soil moisture seeps through the soil and over the sloping impervious rock mantle to be intercepted as channel springs in the deeply incised canyons. This flownet concept is typical of mountainous terrain where the ground water adds to the high quality perennial baseflow of mountain streams.

Table 3-1 gives estimated average water yield data from stream gages in the North Coast area. For example, on a 40-acre block of BLM-managed timberland near Bridgeville, California, the estimated annual runoff from the Van Duzen River is 2,930 acre-feet per square mile. An estimated average annual water yield from this block would be 183 acre-feet.

Streams in SYU 13 flow to the ocean and are not generally diverted for irrigation, industrial, or municipal water supplies. Increased yields add somewhat to alluvial ground water recharge, fisheries, recreation, and aesthetics during the long, dry summer season.

WATER QUALITY

The present water quality of North Coast streams has been adversely affected by past timber harvesting. Timber harvest techniques and quality of harvest operations, coupled with the natural instability of North Coast watersheds, are important factors affecting water quality.

Sedimentation is the major water quality problem that results from timber harvest operations. The chief sources of sediment, as measured at various gaging stations on North Coast streams, are streambank cutting during high flows, earthflow or mass wasting, channel aggradation, and direct runoff

TABLE 3-1

Estimated Average Annual Water Yield Per Square Mile
of Watershed in North Coastal California

GAGING STATION	USGS ID Number	Yrs. of Record	Area (Sq. Mi.)	Ave. Annual Yield (ac.ft.)	Est Yield Per Sq. Mi. (ac. ft.)
Redwood Creek at Orick	11482500	27	278.0	775,200	2790
Redwood Creek near Blue Lake	11481500	11	67.7	193,400	2855
Mad River near Forest Glen	11480500	25	143.0	275,300	1925
Van Duzen River near Bridgeville	11478500	28	222.0	651,300	2930
Eel River at Scotia	11477000	68	3113.0	5,306,000	1700
Bull Creek near Weott	11476500	18	28.1	91,290	3250
South Fork Eel River near Miranda	11476500	39	537.0	1,385,000	2580
South Fork Eel River at Leggett	11475800	13	248.0	662,900	2670
Elder Creek at Branscomb	11475560	11	6.5	20,070	3185
Middle Fork Eel River above Dos Rios	11473900	13	745.0	1,235,000	1655
Eel River at Fort Seward	11475000	23	2107.0	3,428,000	1625
Eel River below Scott Dam	11470500	56	290.0	396,300	1365
Mattole River near Petrolia	11469000	30	240.0	991,800	4130
Noyo River near Fort Bragg	11468500	27	106.0	157,200	1485
Navarro River near Navarro	11468000	28	303.0	378,200	1250
Russian River above East Fork	11461000	28	100.0	128,200	1280

from disturbed sites, such as roads, landings, and ephemeral stream channels. Much of the sediment yield from disturbed sites is redeposited in major channels and is subject to channel aggradation. Recutting and meandering of the channel also influence channel bank cutting and the undercutting of slopes to cause additional mass wasting. Other factors influencing sediment yield are surges of water from the collapse of debris dams, peak flows from either high intensity or long duration storms, or excessive disturbance of upstream ephemeral drainage channels.

Tables 3-2 and 3-3 show examples of normal sediment concentration and discharge on North Coast streams. For example, on a BLM-managed 40-acre block on a South Fork Eel River watershed, the estimated annual sediment yield is 312 tons. Most of the forest land in SYU 13 is located adjacent to the Eel River and its tributaries. However, this figure may be an overestimate where there are also significant sediment inflows as a result of excessive channel bank cutting, degradation of channels, direct mass wasting into channels, and other land uses. Stream channels that drain an undisturbed block of timberland generally are very stable with little evidence of flood scour or debris flow.

Map 3-2 shows the estimated normal annual sediment yields from North Coast watershed lands. For example, on a 40-acre parcel, if the sediment yield shown on the map is 6.6 acre-feet per square mile per year, the estimated annual sediment yield is .41 acre-feet. This figure forms a rough estimate, which may be difficult to apply to an individual tract of land because of many other factors that affect individual yields. These factors include soil type, slope, vegetative cover type, natural instability, stream channel meandering, major floods, debris in channels, and existing land disturbance. The map is most valuable in differentiating between relatively stable watershed areas and those that are highly unstable and could add considerable sediment to the stream system.

The abnormal or man-caused sedimentation now taking place is the result of past activities in or near stream channels, which include the small ephemeral drainages well up on the watershed. Most sedimentation is caused by roads crossing drainage channels, roads paralleling drainage channels, actual physical disturbance in or near a drainage channel, undercutting and subsequent collapse of unstable hillsides, and excessive debris left in channels or flood plains. These conditions on other lands or timbered blocks have had considerable effect on adjacent BLM lands and resources. An example is where sediment and debris from upstream logged-over private land have caused scouring and aggradation of streams through BLM public land.

Closely associated with sedimentation are water quality problems of dissolved minerals or nutrients, reduced dissolved oxygen, heat, and bacteria or pathogens. No summary data are available to describe the extent of this problem for the small streams flowing from the forested public lands of SYU 13.

TABLE 3-2

NORMAL SEDIMENT CONCENTRATION AND AVERAGE ANNUAL SEDIMENT DISCHARGE

CALIFORNIA NORTH COAST WATERSHEDS

STREAM	DRAINAGE AREA (sq. mi.)	STREAMFLOW (cfs/sq.mi.)	AVERAGE SED. CONC. (mg/l)	SEDIMENT DISCHARGE (T/sq.mi./yr.)
Trinity Rv.	727	2.2	90	194
N. F. Trinity Rv.	151	2.9	113	333
Hulls Cr.	25.9	4.1	152	611
S. F. Trinity Rv.	899	1.6	290	460
Upper Mad Rv.	139	2.2	349	743
Outlet Cr.	161	2.3	350	791
S. F. Eel Rv.	44	4.2	361	1479
Trinity Rv.	2846	2.0	411	797
Mad Rv.	484	2.6	1,099	2842
Russian Rv.	100	1.7	1,419	2428
M. F. Eel Rv.	367	2.9	1,437	4038
M. F. Eel Rv.	778	2.8	1,486	4110
S. F. Eel Rv.	537	3.3	1,526	4989
Van Duzen Rv.	216	3.6	1,716	6058
Eel Rv.	1481	2.0	1,826	3519
Eel Rv.	2825	2.3	2,207	4938
Eel Rv.	356	1.4	2,501	3379
Black Butte Rv.	162	1.6	3,620	5869

Source: Anderson 1979

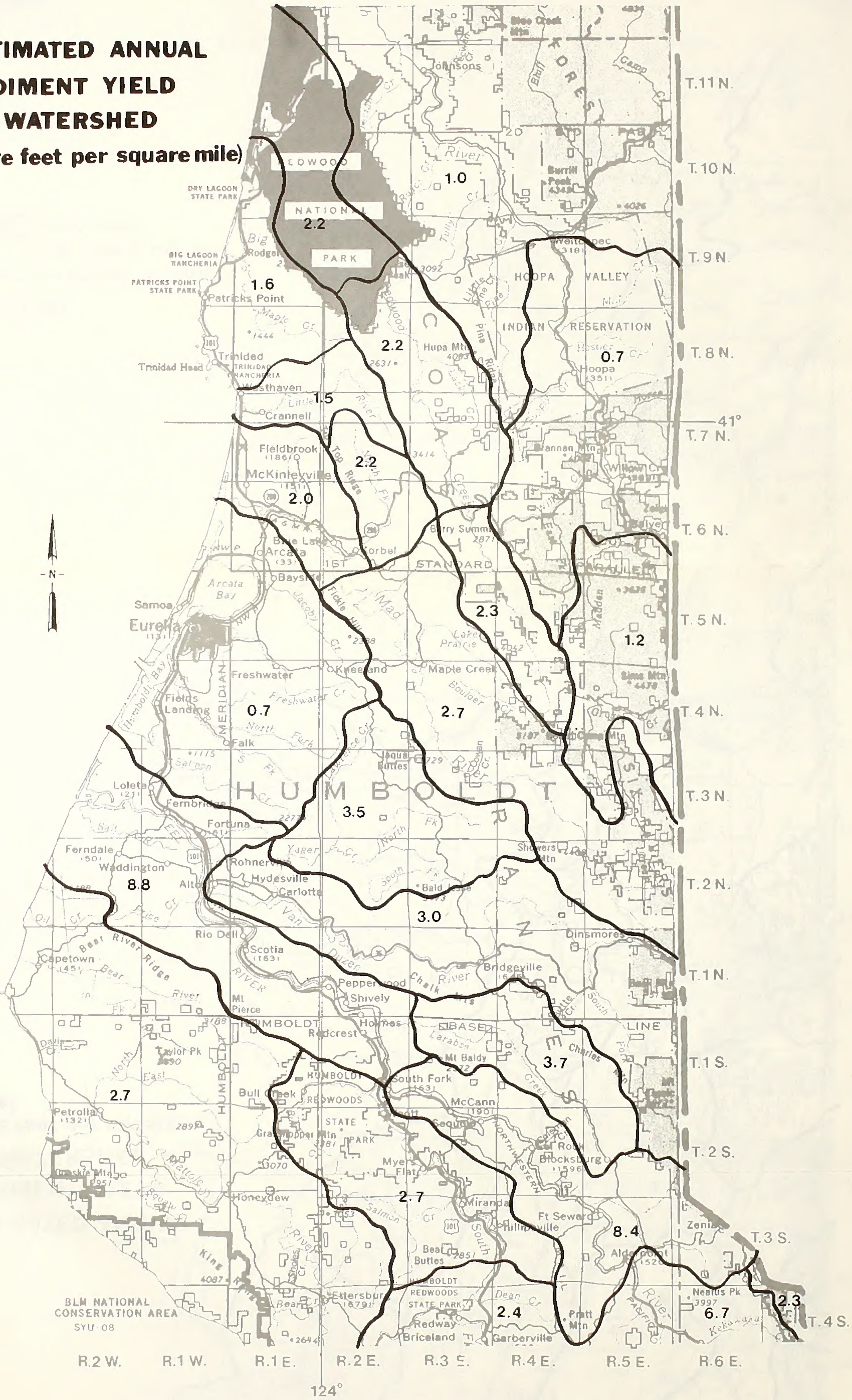
TABLE 3-3

Average Sediment Yield From Relatively Undisturbed Small Stream Basins in Northern California and Southern Oregon

BASIN	DRAINAGE AREA (sq. mi.)	SUSPENDED SEDIMENT (tons/sq.mi./yr.)
Dunn Creek near Bridgeville, Ca.	0.45	110-430
Elder Creek near Branscomb, Ca.	6.5	250
S. Fk. Casper Creek near Fort Bragg, Ca.	1.6	125
N. Fk. Casper Creek near Fort Bragg, Ca.	1.9	182
Olalla Creek near Tenmile, Ore.	-	227
Streamboat Creek near Glide, Ore.	-	137
H.J. Andrews study near Newport, Ore.	-	230
Alsea Study near Newport, Ore.	-	250

Source: Kelsey 1977

ESTIMATED ANNUAL SEDIMENT YIELD BY WATERSHED
(Acre feet per square mile)



SCALE: 1" = 6 MILES

LEGEND:

WATERSHED BOUNDARY

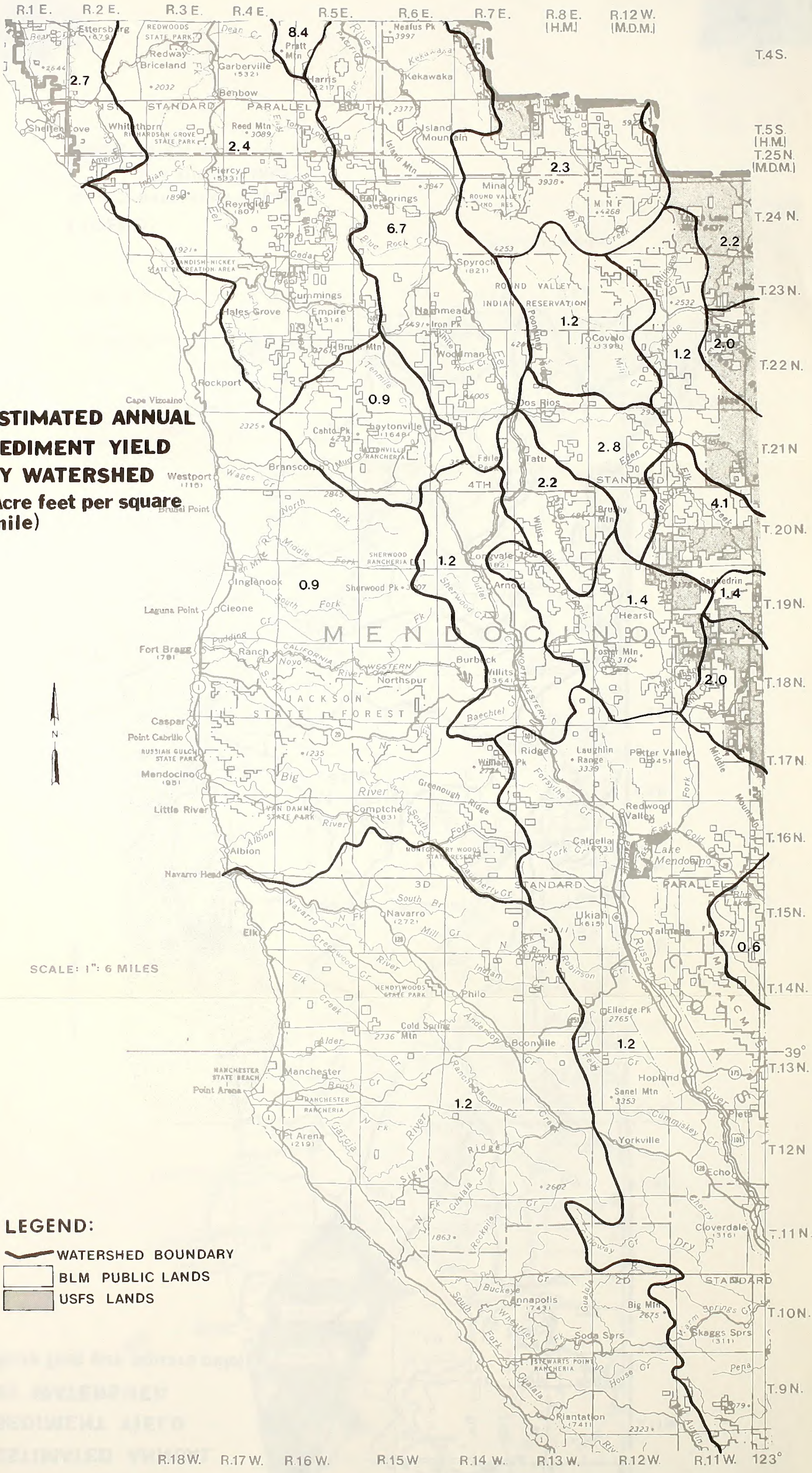
BLM PUBLIC LANDS

USFS LANDS

MAP 3-2
(NORTH)

ESTIMATED ANNUAL SEDIMENT YIELD BY WATERSHED

(Acre feet per square mile)



LEGEND:

- WATERSHED BOUNDARY
- BLM PUBLIC LANDS
- USFS LANDS

MAP 3-2 (SOUTH)

VEGETATION

Terrestrial Vegetation of California (Barbour and Major 1977), including the vegetation map by A. W. Kuchler, was adopted for this environmental impact statement for consistency, ease of reference, and an up-to-date vegetation classification.

According to Kuchler, the three major forests on public land in SYU 13 are the Coast Range montane forest, mixed evergreen forest (Klamath Mountains and North Coast Ranges), and the redwood forest. In addition to these forest types, a complex variety of riparian zones exists.

Coast Range Montane Forest

This forest is limited to the higher elevations on the eastern portion of the SYU. It consists of various mixtures of Douglas-fir *(Pseudotsuga menziesii)*, ponderosa pine *(Pinus ponderosa)*, and white fir *(Abies concolor)*. White fir is the indicator species of this forest type, because Douglas-Fir and ponderosa pine also occur in the mixed evergreen forest. The stands vary from extremely dense when dominated by white fir to open when dominated by pine in an early successional stage. Other common tree associates include black oak *(Quercus kelloggii)* and sugar pine *(Pinus lambertiana)*.

Mixed Evergreen Forest

Productive forest land of SYU 13 has both the Klamath Mountain and the North Coast Range *Pseudotsuga*-hardwood forests. Both of these forests contain primarily Douglas-fir and the broad-leaved sclerophylls tanoak *(Lithocarpus densiflora)* and madrone *(Arbutus menziesii)*. The mixed evergreen forest is bound by a series of vegetation types: the coniferous forests of the Pacific Northwest, redwood forests, montane coniferous forests, oak woodlands, and coastal prairies.

The structure of the forests is typically multistoried with Douglas-fir forming an irregular overstory and tanoak and madrone forming a more regular continuous lower canopy.

The Klamath Mountain *Pseudotsuga*-hardwood forests contain chinquapin *(Chrysolepis chrysophylla)* and Port-Orford-cedar *(Chamaecyparis lawsoniana)* on the more moist sites and sugar pine and ponderosa pine on shallower soils and dry sites at higher elevations.

The North Coast Range forest in southeastern Humboldt County and throughout Mendocino County has ponderosa pine as a major codominant with Douglas-fir and sugar pine as important associates at higher elevations.

The existing communities are extremely complex mosaics of successional patterns because of logging, fires, and grazing, as well as geological and topographical diversity.

Redwood Forest

The BLM administers scattered small blocks of productive forest land in western Mendocino County and Sonoma and Humboldt counties that can be classified as redwood forest. The dominant species are redwood *(Sequoia sempervirens)* and Douglas-Fir.

Tanoak and madrone are common components in this forest type. Sugar pine and grand fir *(Abies grandis)* are minor components on certain blocks.

Riparian Zones

Riparian zones in SYU 13 consist of dense vegetative communities that are well adapted to the moist, shaded conditions adjacent to major streams and the deep canyons of small perennial and intermittent drainages. Additionally, small seeps and spring riparian areas are located throughout all of the forest types and other vegetation types.

The riparian zones, for purposes of this description, are characterized by a tree canopy that is an almost complete crown closure and a very dense understory of shrubs, herbs, and ferns. The species composition varies greatly because of the variation in surrounding forest types and differences in elevation and soil.

The riparian zone is restricted to narrow linear bands along drainages and is rarely identified in a mapping unit at the reconnaissance level. There is seldom an abrupt break between riparian and the surrounding forest type.

In addition to the species found in the surrounding forest types, the riparian zone often contains red alder *(Alnus rubra)*, bigleaf maple *(Acer macrophyllum)*, and black cottonwood *(Populus trichocarpa)*.

As displayed by Kuchler's vegetation map (Barbour and Major 1977), the mixed evergreen forest is the most abundant type on public land in SYU 13. This is followed by the coast range montane forest and then the redwood forest.

While these forest types are not unique, their significance lies in the fact that public land has some of the last remnants of old-growth and undisturbed stands in California. From uncut redwood and Douglas-fir stands in Sonoma County to mixed evergreen forests in Humboldt County, these stands probably contain representatives of almost every conceivable species combination found in the above-mentioned forest types.

Sensitive, Endangered, and Threatened Plants

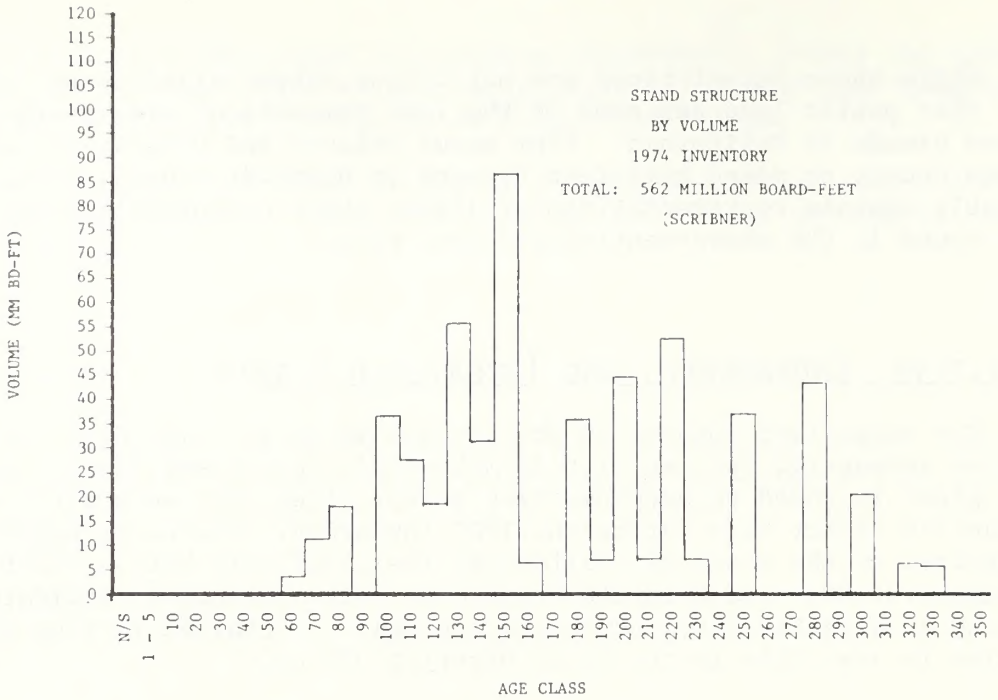
The only plant located in SYU 13 that is on the U.S. Fish and Wildlife Service endangered species list is McDonald's rock-cress *(Arabis McDonaldiana)*. This plant is found on nonproductive forest sites that were withdrawn from the productive timber base during the TPCC inventory. There are numerous plants recognized by the State of California, the California Native Plant Society, and the U.S. Fish and Wildlife Service as being potential candidates for listing as threatened or endangered species. A detailed listing of these species is available in the Ukiah District Office.

Stand Structure and Condition

The stand structure and stocking condition information (Figures 3-1 and 3-2) is condensed from BLM's 1974 extensive timber inventory. The inventory was a double sampling procedure involving an intensive aerial photo inventory and an extensive field sampling for data corrections. The information is not conducive to correlation with the various forest types. Therefore, the information is unitwide and an average of all plots. The same inventory was used to calculate allowable cuts.

Typical virgin stands on the productive forest lands in SYU 13 are uneven-aged mixed stands. These stands are primarily old-growth stands ($\geq$200 years) characterized by a scattered conifer overstory and a mature hardwood brush understory. There are approximately 11,200 acres representative of these stands left on productive forest lands within SYU 13. Logged areas are characterized by a hardwood overstory and a brush and scattered conifer understory.

Logging did not occur on BLM public lands in SYU 13 (except trespass) until the 1940s. Consequently, there are very few stands in the intermediate age classes (30 to 50 years) except those caused by fire. Approximately 25,500 acres are mature and overmature ($\geq$120 years), which are beyond their optimal age for timber production (Figure 3-1).



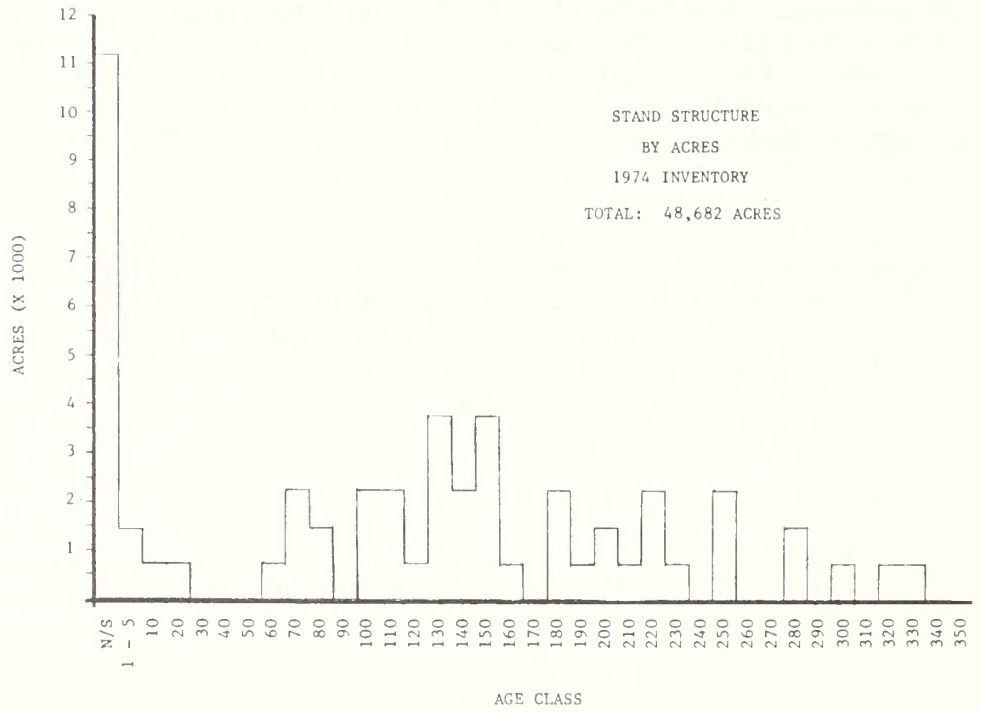


FIGURE 3-1. Stand structure on Timber Production Base.

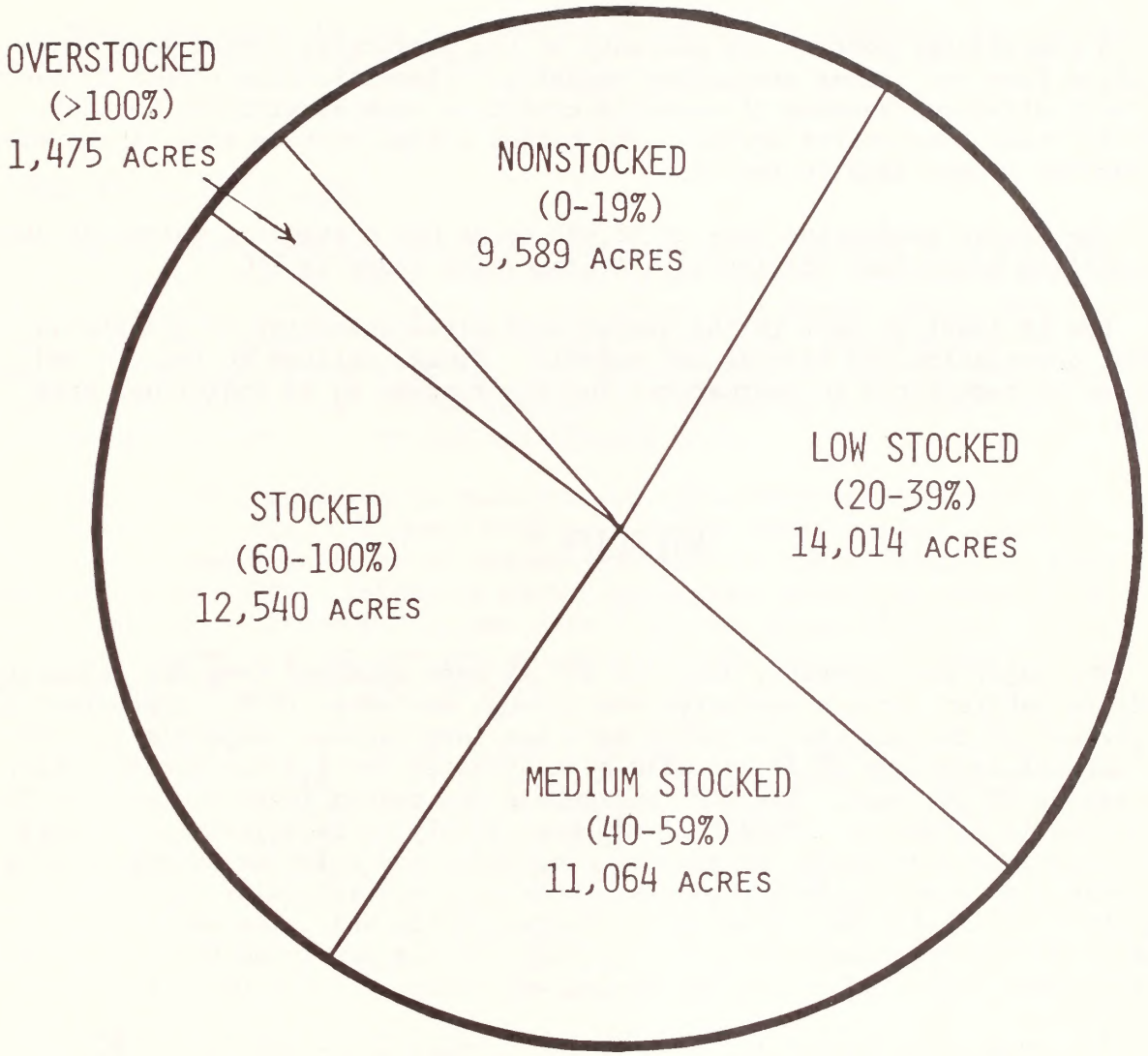


FIGURE 3-2. Stocking Condition of the Timber Production Base by Percent of Normal Stocking of Conifers (1974 Inventory).

Most stands are overstocked with all species, but the hardwood component constitutes a significant portion of many stands. Over 70 percent of the stands are less than adequately stocked with conifers (<60 percent of normal basal area) (Figure 3-2). Past harvesting practices, fire, and natural succession in old-growth have favored hardwoods, which currently constitute 23 percent of the standing volume and are putting on 27 percent of the annual growth.

A significant portion (20 percent) of the productive forest land that resulted from the timber production capability classification (TPCC) inventory has been withdrawn because of resource conflicts such as wildlife habitat, natural areas, and buffer strips. The buffer strips contain some of the most productive forest land in the unit.

The timber production base of 48,682 acres has a standing volume of about 562 million board feet (Scribner). Average site index is 110.

Due at least in part to the uneven-aged mixed character of the stands, insect depredation and disease are endemic. Damage related to insects and disease is restricted to overmature, low vigor stems on an individual tree basis.

WILDLIFE

The major site-specific data for SYU 13 were obtained from BLM integrated wildlife habitat surveys conducted May through September 1978. Approximately 10 percent of the District's timber base was inventoried. Appendix 3-2 shows the general locations of 77 specific sites visited for a 3-day period during one season of the year. The BLM considers a one season inventory such as this to be low in intensity. Forest stands most likely to be logged in the next 5 to 10 years were surveyed for species occurrence and relative abundance with emphasis placed on the larger blocks. Data were statistically analyzed by Rosenberg (1979) for more frequently observed birds and selected habitat types. Extensive ground and aerial surveys for the peregrine falcon and other raptors were conducted during the spring and summer of 1979 (Monk 1979).

Information contained in *North Coast/Cascades Zone-/California Wildlife/ Habitat Relationship Program* (USFS 1979a) and *Wildlife Habitats in Managed Forests* (Thomas 1979) was use extensively.

Major data gaps include the lack of quantitative data and an incomplete survey. Information is especially lacking for the many small isolated blocks, and winter season inventories were not conducted. Remnant BLM low elevation forest tracts may be extremely important for migrating and wintering birds (Sprunt 1975). Time constraints impeded the verification of animals expected to be present in low numbers.

Available data are not adequate to confer final clearance on endangered, threatened, or sensitive species.

TERRESTRIAL WILDLIFE

Public participation determined that the major concern involved with the proposed action is the further reduction of old-growth wildlife habitat (BLM scoping sessions 1979). Therefore, old-growth and mature forest habitats and their attendant species will receive major emphasis. Species that rely upon habitat components associated with old-growth forests, such as large snags, down woody debris, broad-leaved vegetation (including hardwoods), and vegetation structure, are also emphasized (Figure 3-3).

Because of the long-term stability of old-growth stands, certain wildlife species have evolved in harmony with this stable condition and little need has arisen for these species to be highly adaptable to rapid changes in their habitat (Wight 1974). Intensive timber management practices severely alter forest habitat. Old-growth is the most difficult stage of forest succession to provide under present concepts of silviculture and is the stage that is most rapidly being lost (Miller 1978).

Throughout SYU 13, forest habitat on BLM public land occurs in relatively small scattered blocks. This is particularly so in Humboldt and Trinity counties and the western portion of Mendocino County. The highest quality wildlife habitat within these blocks usually occurs in the vicinity of perennial streams and is therefore further restricted. The BLM controls a major amount of the remaining old-growth forest throughout the coastal area of northwestern California. This is particularly true for the mixed evergreen vegetation type. The forested aspect of these stands is readily apparent from the air, and it has been stated that you can often see where BLM land is, simply because that is where the trees are. The Bureau also administers other public land where old-growth is developing. BLM blocks comprise virtually virgin stands of various ages and all have hardwoods to varying degrees (BLM scoping sessions 1979). The vegetative zones are described in the vegetation section of this chapter.

The original size of these blocks and extensive timber harvest on the intervening areas of private land, and to a lesser degree on BLM-managed land, have resulted in the insularization of the remaining forest habitat. As these habitat islands become smaller, they lose their ability to provide suitable habitat, particularly for species that need large areas to fulfill their life-cycle requirements (Whitcomb et al. 1976). Examples of such species occurring in SYU 13 include the pine marten, fisher, goshawk, and spotted owl. Occurrence of pine marten and fisher has not been verified on BLM-managed tracts. However, possible sightings have occurred at the Nature Conservancy's North Coast Preserve (Larsen and Grover 1977) and in Elk Creek adjacent to the Mendocino National Forest (CDFG 1979a). Most-likely locations occur adjacent to the BLM and U.S. Forest Service boundary line. Since these animals use large territories, the majority of the remaining BLM-managed tracts are too small to provide all of the habitat requirements for the pine marten and fisher.

These remaining BLM-managed islands represent important reservoirs for old-growth and mature forest species (Monroe 1978). The BLM-managed blocks have the potential for providing long-term unique and diverse habitats (McLaughlin 1979 and Bull 1978) in an area where, according to Leopold (1978), the redwood region of Northern California is maintained in dense, fully stocked stands with little attractiveness to wildlife. The importance of these BLM-managed blocks is well described on a more local basis by Sutherland (1979).

It is generally accepted that with today's timber management practices, the private lands surrounding these BLM-managed islands will never again reach a seral stage compatible to old-growth-dependent wildlife because they will be harvested before timber reaches that point (Toffoli 1979). It cannot be assumed that the private sector will provide old-growth habitat because there is no incentive to do so. It is assumed that ample habitat will be provided on the large private holdings for common species that are more adaptable to a variety of habitat conditions, including earlier stages of forest succession. The fact that harvesting these small blocks could provide minor benefits to animals such as deer, quail, ground squirrels, etc., is not of great significance in SYU 13.

Although a number of State and Federal parks occur within the SYU 13 administrative boundaries, they do not fulfill the requirements for old-growth reserves on a regional basis. Most are relatively small and committed to heavy visitor use. They do not contain an adequate variety of vegetation types, and they are not well distributed throughout the region. The BLM-managed lands essentially fill-in forest habitat gaps, particularly for low elevation conifer forest types between the Pacific Ocean and the U.S. Forest Service-managed lands to the east. The overall distribution, spatial arrangement, size, and amount of disturbance of island habitats are important to the retention of species (Diamond 1975 and 1976; Teborgh 1976; Whitcomb et al. 1976). Some feel that it is important to maintain species throughout their original range as pointed out by LaFollette (1979) in her analysis of the Oregon Spotted Owl Management Plan.

FIGURE 3-3

Old-Growth Habitat Components

The study area provides habitat for numerous wildlife species. Available information indicates that approximately 16 species of amphibians, 19 species of reptiles, 127 species of birds, and 64 species of mammals occur or could occur in or next to BLM-managed forest tracts. Additional wintering and migrating birds also use the area. (A species list is available from the BLM Ukiah District Office upon request.) Of these, 77 species were selected for impact assessment using seven criteria (Appendix 3-3). Selection included the various groups of animals subject to a variety of impacts which the proposed timber management alternatives could cause. Appendix 3-3 indicates that wildlife species use several stages of forest succession for their life requirements. Species that concentrate their life activities in fewer stages have narrower amplitudes of tolerance (Vogel 1976). These species are less adaptable and thus more vulnerable to disruptions in their preferred or required habitat (Thomas et al. 1977). Such is the case with species that depend on mature and old-growth forest and species that require habitat components produced in an old-growth forest. Some species require several distinct habitat stages or types. For example, a mature forest may be required for breeding, while feeding occurs in more open, cutover areas or meadows. Breeding habitats are generally considered less flexible than feeding habitats (Maser and Thomas 1978).

For some species, habitat requirements, occurrence, and relative abundance are not known (USFS 1979a). Information in Appendix 3-3 includes the use of both available data and subjective judgment and is not intended to be a complete list of all animals subject to impact (e.g. a number of additional and less sensitive species will be impacted by the proposed removal of broad-leaved trees).

Observation areas of important old-growth indicator species, including the goshawk and spotted owl, are shown on Map 3-3. These species require relatively large habitat areas and their presence indicates that suitable habitat for other mature and old-growth-dependent species may also be present. These areas vary in overall habitat quality. Subsequent to observation, logging has continued at several of these locations.

Because of an existing shortage of mature and old-growth forest, with further reduction planned for the future, BLM-managed lands are important throughout the coastal region of northwestern California to wildlife species associated with these habitats.

Sensitive, Endangered, and Threatened Animals

Federally protected threatened and endangered species include the golden eagle, bald eagle, and peregrine falcon.

Seven other species are accorded sensitive or special interest status by BLM and the California Department of Fish and Game (CDFG) (Appendix 3-3). Included are the redlegged frog, California mountain king snake, osprey, spotted owl, ringtail, river otter, and mountain lion.

Fisheries

The major streams that drain the SYU 13 area are the Klamath, Bear, Eel, Mad, Van Duzen, Mattole, Navarro, and Gualala rivers, and Redwood Creek. Many smaller creeks and tributaries are also involved in these widely scattered tracts. Fish habitat in the SYU 13 timber base totals approximately 27 miles in 43 different streams and averages .6 mile per stream. These streams and the species found in the timbered tracts are listed in Table 3-4 and shown on Map 3-3. The Eel River system contains the majority of the SYU 13 land. Appendix 3-4 lists all of the freshwater and anadromous fishes (excluding estuarine) in the Eel River system.

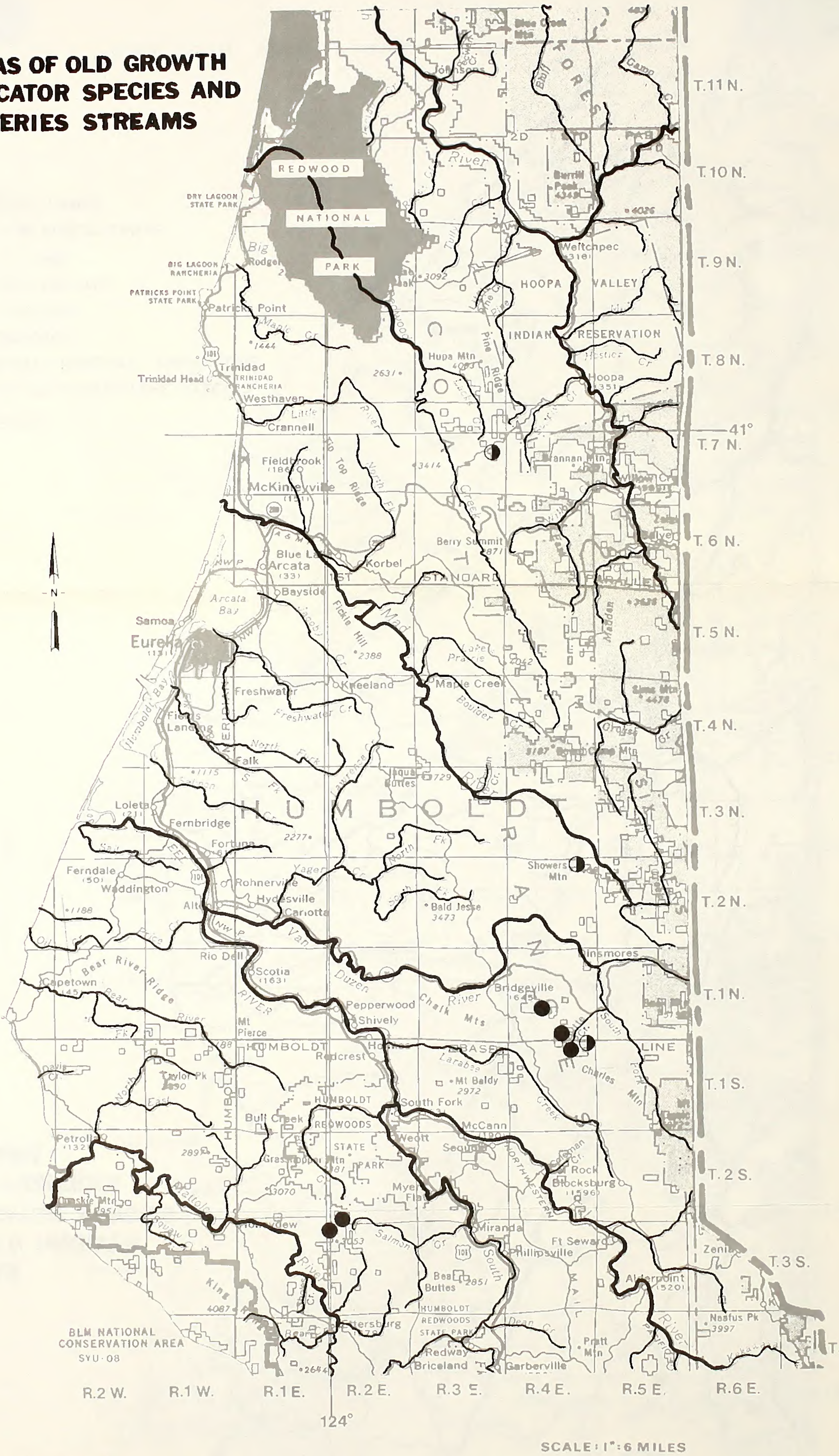
Most of the timber tracts are located in the headwaters of their drainages and contain only rainbow or steelhead trout. These trout, along with the King and silver salmon found in a few of the tracts, make up the most significant fisheries resources in the drainages. The salmonid species are quite sensitive to disturbance of their habitat and have suffered a significant decline in recent decades. The exact causes of this decline have not been identified. However, there is a strong consensus that poor logging practices have been a major element in the decline of salmonid species in the North Coast area (Moring 1975 and Moring and Lantz 1974). Brown and Haley (1974) state that aggradation (building of silt and gravel deposits) of the Eel River has resulted in deterioration of salmonid nursery habitat. But they could find no evidence of spawning habitat being a limiting factor to production of salmon and steelhead. Exact locations of spawning and nursery areas have not been determined. However, headwater streams are generally considered to be important for these purposes.

Other species, mostly nongame and estuarine, are found in the larger rivers downstream from the proposed timber harvest areas. Lists of these species are available upon request from the Ukiah BLM District Office. In the process of writing this EIS, it became apparent that the following information could have been helpful in reaching more knowledgable decisions:

1. Major spawning areas for salmonids in relation to SYU 13 timber tracts. This would require several years of observation over a broad area of both public and private land.

2. Population trends of salmonids within the stream sections on the timber tracts. This would require about 5-10 years of population sampling in each tract.

AREAS OF OLD GROWTH INDICATOR SPECIES AND FISHERIES STREAMS



LEGEND:

GENERAL LOCATIONS WHERE SELECTED OLD GROWTH INDICATOR SPECIES HAVE BEEN OBSERVED.

- ◐ GOSHAWK
- ● SPOTTED OWL
- STREAMS
- BLM PUBLIC LANDS
- USFS LANDS

MAP 3-3 (NORTH)

AREAS OF OLD GROWTH INDICATOR SPECIES AND FISHERIES STREAMS

SCALE: 1": 6 MILES

LEGEND:

GENERAL LOCATIONS WHERE SELECTED OLD GROWTH INDICATOR SPECIES HAVE BEEN OBSERVED.

- GOSHAWK
- SPOTTED OWL
- STREAMS
- BLM PUBLIC LANDS
- USFS LANDS

R.1 E. R.2 E. R.3 E. R.4 E. R.5 E. R.6 E. R.7 E. R.8 E. (H.M.) R.12 W. (M.D.M.)

T.4 S.
T.5 S. (H.M.) T.25 N. (M.D.M.)
T.24 N.
T.23 N.
T.22 N.
T.21 N
T.20 N.
T.19 N.
T.18 N.
T.17 N.
T.16 N.
T.15 N.
T.14 N.
39°
T.13 N.
T.12 N
T.11 N.
T.10 N.
T.9 N.

R.18 W. R.17 W. R.16 W. R.15 W R.14 W. R.13 W. R.12 W. R.11 W. 123°

MAP 3-3 (SOUTH)

TABLE 3-4

STREAMS IN SYU 13 TIMBER BASE THAT CONTAIN FISH

Name	Location Map 3-3	Length in Timber Base	Length Downstream From Timber Base	10-Year Timber Sale Number	Species
Eel River Drainage					
Eel River	T19N, R12 & 13W T20N, R13W	1.2	*		SH, KS (Major Species)
Eel River, East Bn., S.F.	T24N, R16W	1.2	*		SH
Van Duzen River, S.F.	T1S, R5E	.5	*		RT
Butte Cr.	T1N, R4E	1.5	2.5	91-1	RT
Coleman Cr.	T2S, R4E	1.6	.8		SH, RCH
Larabee Cr.	T1S, R3E	.2	6.2	87-2	SH
Pipe Cr.	T5S, R5E	.6	4.0		SH
Unnamed Cr.	T19N, R13W	.5	0		RT
White Rock Cr.	T22N, R14W	.8	2.0		SH
Cedar Cr.	T23N, R17W	1.5	3.0		SH, SS
Mud Cr.	T21N, R15W	.1	3.2		SH, SS
Unnamed Cr.	T23N, R15W	.1	.3		SH
School Section Cr.	T24N, R16W	.2	.2		SH
Tom Long Cr.	T5S, R5E	.2	3.0		SH
Hulls Cr.	T24N, R12W	1.0	*		SH
Williams Cr.	T23N, R11W	.5	8.0		SH, RT
Twin Bridges Cr.	T19N, R12W	.5	.2		SH
Whitney Cr.	T18N, R11W	.2	1.0		SH
Mill Cr.	T18N, R11W	1.5	1.0		SH, RT
Hale Cr.	T18N, R12W	.2	1.0		SH
Tomki Cr.	T18N, R12W	.6	1.2		SH, KS
Scott Cr.	T18N, R12W	.2	0		SH, KS
Navarro River Drainage					
Indian Cr.	T14N, R13W	.3	8.5		SH, RCH
Indian Cr., N.F.	14N, R14W	.1	1.7		SH, RCH
Indian Cr., N. Bn., N.F.	T15N, R13W	1.5	.5		RT
Indian Cr., S. Bn., N.F.	T15N, R13W	1.0	.2		RT
Camp Cr.	T13N, R14W	.2	1.0		SH, RCH

Legend: * Larger Stream Systems (+ 10 miles)

SH-Steelhead RT-Rainbow Trout SS-Silver Salmon KS-King Salmon STG-Green Sturgeon RCH-Western Roach SQF-Sacramento Squawfish SKR-Humboldt Sucker

Name	Location Map 3-3	Length in Timber Base	Length Downstream From Timber Base	10-Year Timber Sale Number	Species
Klamath River Drainage					
Klamath River	T9N, R4E	1.0	*		SH, KS, SS, STG (Major Species)
Pecwan Cr.	T12N, R3E	.3	.5		SH
Pecwan Cr., W.F.	T12N, R3E	.3	.3		SH
Pine Cr.	T9N, R4E	.2	3.0		SH
Little Pine Cr.	T9N, R3E	.5	1.2		SH
Mad River Drainage					
Mad River	T3N, R3E	.5	*		SH, KS, SS
Cowan Cr.	T3N, R3E	.1	0		SH
Mattole River Drainage					
Mattole River	T5S, R2E	.2	*		SH, SS
Mattole River, N.F.	T1S, R1W	.2	*		SH, SS
American Cr.	T5S, R2E	.6	.7		SH
Sholes Cr.	T3S, R1E	.7	2.0		SH
Squaw Cr.	T3S, R1W	.5	7.0		SH
Scotts Cr. Drainage (Clear Lake)					
Scotts Cr., N.F.	T14N, R11W	3.0	1.0		RT,RCH,SQF,SKR
Russian River Drainage					
Mill Cr., N.F.	T15N, R11W	.7	.7		RT
Coast Drainages					
Alder Cr.	T13N, R16W	.3	4.2		SH
Davis Cr.	T1S, R2W	.2	2.5	90-1	SH

Legend: * Larger Stream Systems (+ 10 miles)

SH-Steelhead
RT-Rainbow Trout
SS-Silver Salmon
KS-King Salmon
STG-Green Sturgeon
RCH-Western Roach
SQF-Sacramento Squawfish
SKR-Humboldt Sucker

3. Habitat trends of private lands adjacent to BLM timber tracts which, as a consequence of their location, affect the quality of BLM aquatic habitat. This would require many years of observation by a multi-disciplined team over a broad area of private land.

RECREATION

Most of the public lands in SYU 13 are in small scattered blocks and are steep and heavily vegetated. A few blocks have legal public access, but many have neither legal nor physical access. The recreation use potential of most of the forest lands is relatively low. Exceptions are those that have value because of large size; easy existing or potential access; or the existence of specific high quality resources, such as water bodies, high wildlife populations, and unique scenery. Of particular importance are many valuable river corridors, several of which have been designated components of the California Wild and Scenic Rivers System (Map 3-4).

Forested public lands within the unit that have public access are currently lightly used. All such areas are comparatively remote and their locations relatively unknown. The major activity is hunting, although there is some stream fishing on lands containing fishable waters. Where access exists, there have been occasional reports from adjacent landowners of trespass and litter problems, but because of the light use the problems appear relatively minor.

In the mid-1960s the BLM Ukiah District inventoried potential recreation development sites. There were 108 designated sites within SYU 13. The criteria used for the inventory included available water, moderate slopes, attractive vegetation, and recreation resources in the area. Re-analysis of the sites indicates that several tracts have very low development potential because of their size and remoteness. However, many still have long-range development potential. A list of the sites is available in the BLM Ukiah District Office library.

Because of low population, recreation use pressures are generally not intense in the northern part of SYU 13. This is not true for specific zones such as ocean frontage, tourist highway corridors, and areas near towns and cities. Population pressures, and therefore recreation needs, increase in the southern part of the unit in Sonoma County and parts of Mendocino County. Unless factors such as income or transportation impede it, the demand for recreation, as well as for other resource uses, will continue to increase as population expands.

Public concerns indicate a perceived need for more access to public lands. Because there are relatively few large blocks of land available for hunting west of the Mendocino and Six Rivers National Forests, most of this demand seems related to a need for hunting areas.

NATURAL AREAS

Natural areas include natural features such as biological, geological, paleontological, or other landscape elements that warrant preservation for scientific or educational purposes because of their uniqueness, scarcity, or representativeness.

One of the primary goals of the natural area program is the preservation of the representative samples of all ecosystems. The major endangered ecosystem that could be impacted by the proposed action is the mixed evergreen forest. Areas containing an old-growth Douglas-fir ecosystem of significant size (300-900 acres) are becoming increasingly rare in the Coast Range, especially at the low elevations in the outer Coast Range. (See the wildlife section for a more detailed discussion of old-growth habitat.) The Northern California Coast Range Preserve near Branscomb (Map 3-4) is the only area with a large acreage of the old-growth community that has been formally designated for preservation.

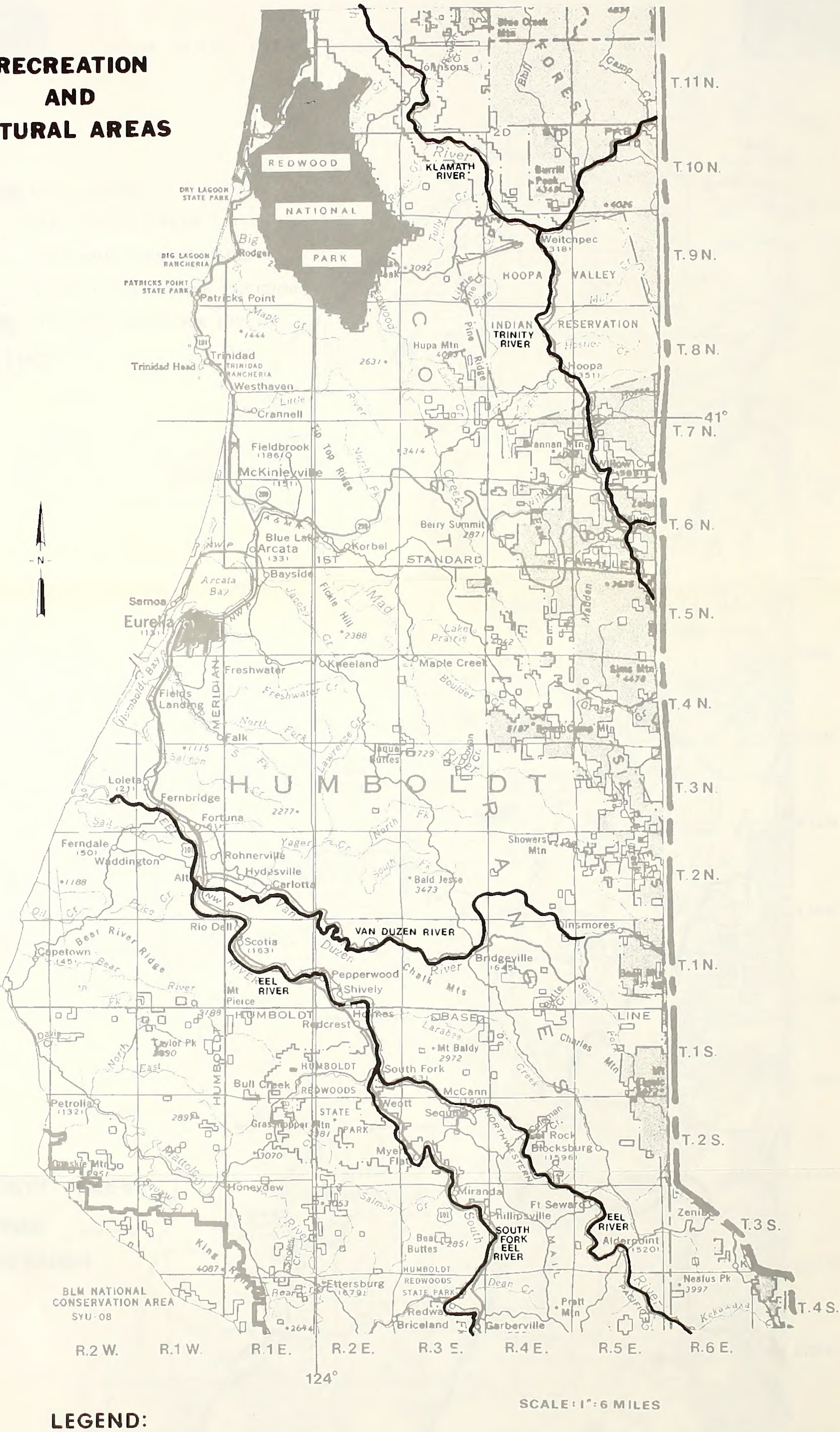
Outside SYU 13 but in the lower elevation Coast Range, the King Range National Conservation Area (SYU 8) has a 1,500 acre block of old-growth habitat. This block is currently in temporary protective status, pending a wildlife inventory and subsequent long-term preservation decisions.

The BLM planning system recommendations for SYU 13 include preservation of 90 acres of old-growth at Butte Creek and approximately 1,700 acres of old-growth at Gilham Butte.

A systematic inventory of old-growth areas has not been made. However, inquiries to other government agencies indicate that there are few such areas of significant size within other protected zones (State parks, State forests, wilderness areas). There is also general concensus that there is little old-growth Douglas-fir left in private ownership, and none in large blocks, that will not eventually be logged. Therefore, it appears that SYU 13 contains some of the last remaining sizable blocks of old-growth habitat for which there is preservation opportunity.

In 1965 the BLM Ukiah District inventoried for tracts that contained stands of virgin redwood (Map 3-4). Eighteen tracts, some containing two to

RECREATION AND NATURAL AREAS



LEGEND:

- WILD AND SCENIC RIVERS
- BLM PUBLIC LANDS
- USFS LANDS

MAP 3-4
(NORTH)

RECREATION AND NATURAL AREAS

R.1 E. R.2 E. R.3 E. R.4 E. R.5E. R.6 E. R.7 E. R.8 E. (H.M.) R.12 W. (M.D.M.)

T.4 S.
T.5 S. (H.M.)
T.25 N. (M.D.M.)
T.24 N.
T.23 N.
T.22 N.
T.21 N
T.20 N.
T.19 N.
T.18 N.
T.17 N.
T.16 N.
T.15 N.
T.14 N.
39°
T.13 N.
T12N
T.11 N.
T.10N.
T.9 N.

R.18 W. R.17 W. R.16 W. R.15 W R.14 W. R.13 W. R.12 W. R.11 W. 123°

SCALE: 1": 6 MILES

LEGEND:

- REDWOOD INVENTORY TRACTS
- NATURAL AREAS (MFP DECISION)
- WILD AND SCENIC RIVERS
- BLM PUBLIC LANDS
- USFS LANDS

MAP 3-4 (SOUTH)

four small parcels, were found. Three of these are no longer in public ownership and one is outside SYU 13. The extent of the groves and the size of the trees varied considerably among the sites. A few have redwoods of impressive size.

The California Department of Fish and Game and the Nature Conservancy, in cooperation with an interagency task force, recently initiated a California natural area program. The BLM is a member of the task force. The initial program is a "two-year effort aimed at identifying significant natural areas, establishing priorities for their protection, developing a protection planning strategy, and initiating protection for those areas already known to be highly significant" (California Department of Fish and Game 1979b).

CULTURAL AND SOCIOCULTURAL RESOURCES

Cultural and sociocultural resources are defined in BLM Manual 8100 and included in the glossary.

Values

The people of northwestern California have demonstrated a strong commitment to preserve their cultural heritage. The organization of several local museums, growing membership in local historic societies and Native American heritage organizations, increased popularity of grassroot family histories, and the passage of local protective legislation (Mendocino County Archaeological Ordinance) all reflect this commitment.

Burial places, cemeteries, village areas, and ceremonial shrines are especially important to Native Americans.

Prehistoric Past

To date there have been very few archaeological excavations conducted in northwestern California. Interpretations of the prehistoric past must therefore be considered tentative until additional research is undertaken.

The antiquity of human occupation in northwestern California has long been the subject of intense archaeological debate. Presently, most archaeo-

logists agree that prehistoric populations entered the region at least 12,000 years ago. Their places of origin and the factors promoting their migration are unknown.

The prehistoric past for the SYU 13 region can be viewed as a series of successive changes. Early populations (10,000 B.C. to about 3000 B.C.) are characterized as hunters and gatherers (Kroeber 1971, p. 112-127; Fredrickson 1973, 1974; King 1973a, 1973b; King and Hickman 1974; Tamez 1978; Wallace 1978; Elsasser 1978). Their social and economic structure was organized around the small nomadic band. Individual family units moved systematically with the seasons to exploit various animal and plant resources. In contrast, the late (3000 B.C. to about A.D. 1840) prehistoric hunters and gatherers were more sedentary with larger populations. Extended family groups occupied sizable villages in the valleys close to either rivers or perennial streams on a year-round basis. Their social and economic organization was extremely complex. Anthropological studies (Kroeber 1925; Heizer and Whipple 1951, Baumoff 1963, 1978) characterize the late populations as being especially well adapted to their local environment. Peoples to the north depended primarily on salmon or anadromous fishes as their major staple, while folks to the south relied heavily upon acorns. Figure 3-4 schematically depicts the prehistoric periods of northwestern California.

Demographic studies (Cook 1978, p. 91) have revealed that prehistorically the study area was one of the most densely populated regions in the State. Humboldt and Mendocino counties offered prehistoric hunters and gatherers an extremely rich environment to exploit.

Prehistoric Site Frequency and Distribution

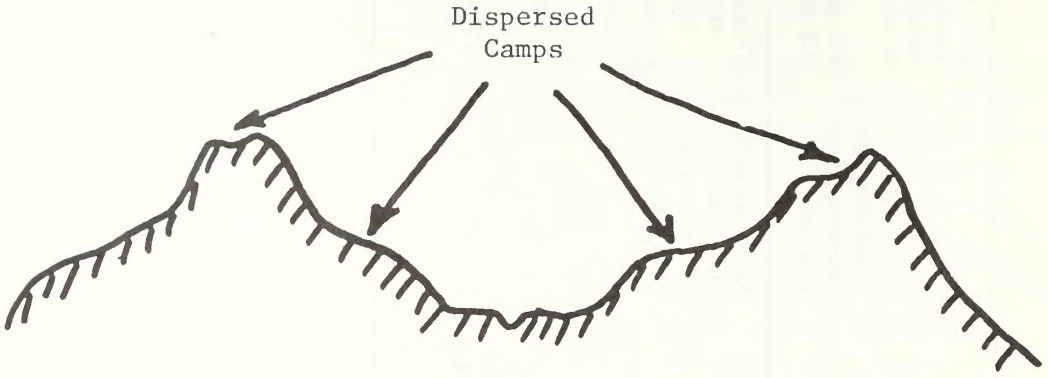
Presently, it is not possible to predict, with any great degree of confidence, the location and number of prehistoric sites in the study area. The gross predictions offered here are based upon limited inventory data (less than 1 percent of Mendocino and Humboldt counties have been archaeologically inventoried) and must be considered highly speculative until additional studies have been completed.

Available ethnographic and archaeological data suggest that the upper elevations were used on a seasonal basis during both the early and late prehistoric periods. Previous research also indicates that upper elevation, prehistoric sites tend to occur near water in areas containing abundant and diversified animal and plant populations, i.e., wet meadows, springs, and glades (King 1973a, 1973b; King and Hickman 1974; Jackson 1976; Tamez 1978; Bickel 1979). Most sites have been discovered on crests of trending and adjoining ridges and frequently on midslope terraces (Figure 3-5).

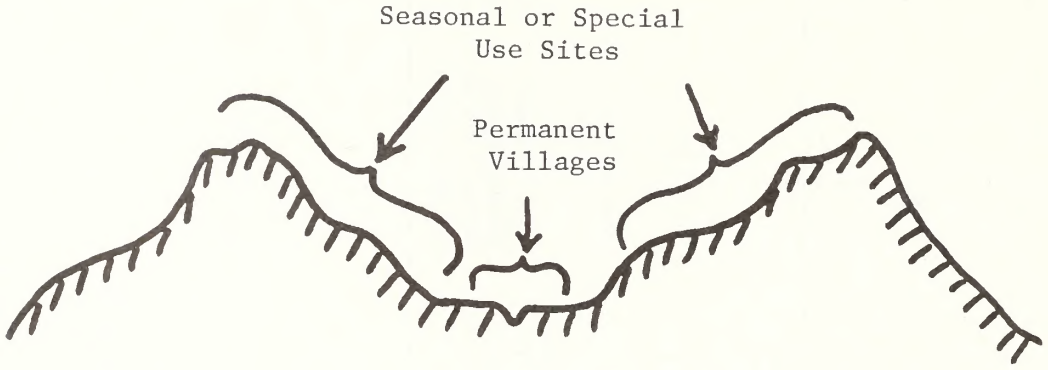
1840 AD
10000 BC
3000 BC
Late
Early
Upper Archaic Period
Middle Archaic Period
Lower Archaic Period
Paleo-Indian Period
Berkeley Pattern
Houx Aspect
Borax Lake Pattern
Post Pattern
(related to earlier Borax Lake wide-stemmed point?)
Many leaf-shaped points
Excelsior points become shortened and narrower through time
Houx Aspect is a coalescent of Berkeley and Borax Lake?
Ties seem closest to Bay and Delta
Mortar and pestle (mano and metate drop out)
Excelsior (late addition?)
Mortar and pestle introduced: co-occurs with mano and metate
Thomes Creek District:
stemmed point most frequent
"inscribed stones"
core tools
Borax Lake District:
leaf-shaped point most frequent
small tabular stone (related to later painted tablets?)
Willow-leaf
Excelsior and concave base points
Expanding stem (late addition to Borax Lake District?)
(related to similar points from Central Valley and to Humboldt concave base A?)
(Willow-leaf and Excelsior related to Old Cordilleran, but later in time?)
"Coarse, single-flake blades"
Mano and metate inferred
Borax Lake wide-stem
(related to similar points – all later in time? – from Martis Complex and other Northern California assemblages?)
Borax Lake fluted
Crescent
(Related to assemblages from Tulare Lake, Buena Vista Lake?)

FIGURE 3-4. Cultural Sequence Within the North Coast Ranges (Paleo-Indian and Archaic Periods).

Source: Fredrickson 1974



Idealized topographic cross-section showing projected distribution of early prehistoric settlement patterns (King and Hickman 1974, p.5).



Idealized topographic cross-section showing projected distribution of late prehistoric/protohistoric settlement patterns (King and Hickman 1974).

FIGURE 3-5. Projected Distribution of Early Prehistoric and Late Prehistoric/Protohistoric Settlement Patterns.

Source: King and Hickman 1974

Although northwestern California was densely populated during the prehistoric past, the SYU 13 study area is not expected to have a high frequency of archaeological sites since most parcels are characterized as "rugged environments." The upper elevation timber tracts are predominately thickly vegetated steep slopes (40 to 60 percent).

Historic Past

The history of northwestern California can be organized around five periods (Herbert, Patterson, and Wee 1979). The first period is characterized as a time of great exploration. From 1579 to 1848 numerous seaborne explorers and overland fur trappers entered the region to seek fame and fortune. The second period from 1848 to 1860 began the initiation of settlement as reflected in the growth of towns, packing trades, and an interest in agricultural development. This period was greatly influenced by the desire to go west and strike it rich in the gold mines of northwestern California. The third period from 1860 to 1865, commonly referred to as "The Indian Wars," had a devastating effect upon the Native Americans. More to the historic point, in fact, the period was one of full-scale slaughter of almost an entire population (90 percent reduction in the Native American population) rather than a so-called "war" (Cook 1978; Castillo 1978). The fourth period marked an increased growth in commercial agriculture, sheep and cattle grazing, and the logging industry. The coast redwood timber industry was a dominant commercial activity during this period. The period ended with the coming of the modern age around 1914. Unlike many areas throughout the State, the modern age resulted in a drop in agricultural production. The timber industry continued to expand, and production increased as a result of harvesting Douglas-fir. Increased popularity of the region's natural beauty made tourism a viable economic pursuit.

Historic Site Frequency and Distribution

Historic sites, including trails, Indian refuge sites, roads, camps, livestock watering sites, corrals, fences, survey monuments, logging remains of various sorts, cabins, mining sites, and stills may exist on BLM-managed lands (Herbert, Patterson, and Wee 1979). Their exact location and numbers are impossible to predict at this time. In northwestern California, the historic past is manifested in old buildings and structures that are standing to this day. It also lies buried in the ground in an archaeological context. Archaeologists are becoming increasingly interested in the excavation of such sites. The historic past for this portion of the State is not well documented. Knowledge of the day-to-day activities of the early settlers awaits future archaeological investigation.

INVENTORIES

In order to assess the potential impacts of the proposed alternatives on cultural and sociocultural resources, and in compliance with Federal legislation, the Ukiah District Office contracted with various institutions and professionals to complete the following studies and inventories.

1. "Class I - Prehistoric and Ethnographic Overview" (Tamez 1978) provides a review and synthesis of existing regional archaeological, ethnological, and ethnohistorical data. Information was derived from numerous published and unpublished documents. Statements are made regarding the general nature, distribution, and significance of cultural resources located in northwestern California. Past, present, and future research are discussed and management recommendations are offered.

2. "Class I - Historic Overview" (Herbert, Patterson, and Wee 1979) provides a review and synthesis of existing historical data. A general narrative of the historic past is presented with special emphasis on previous economic activities. Data were derived from historic plats and other pertinent sources.

3. "Class III - Intensive Field Inventory" (Levulett and Ruhstaller 1980) entailed a complete on-the-ground examination of all units included within the model 10-year timber management plan (Map 2-2, inside back cover). A total of 4,220 acres were systematically inventoried. Professional archaeologists walked over each tract in search of stone artifacts, prehistoric and historic structures, cemeteries, and other cultural phenomena. Eleven sites were recorded within the proposed 10-year timber harvest area as a result of this study. Each site is described in detail in Appendix 3-5.

4. "The Inventory of Sites Significant to Native Americans" (Marks and Bramlette 1979) entailed interviews with several tribal scholars representing numerous Native American communities throughout northwestern California. Two sites of sociocultural significance were recorded within the areas of the model 10-year timber management plan. To facilitate the continuing process, seven Bureau of Land Management American Indian advisory committees were established.

All reports are on file at the Ukiah District Office and are available for review. Copies (without precise site locations) are also on file with several museums, universities, and libraries. Appendix 3-6 lists those institutions. In the course of these analyses, many local, State, and Federal agencies were consulted (Appendix 3-6).

National Register Significance

Currently there are no cultural or sociocultural sites on public land within the SYU 13 study area that are listed on the *National Register of Historic Places (Federal Register,* February 1979 and recent supplements). The cultural resource inventories conducted as a part of this EIS resulted in the identification of 1 historic, 10 prehistoric, and 2 sociocultural sites. The BLM and the State Historic Preservation Office will determine possible eligibility of listing the cultural resource sites in the *National Register of Historic Places,* as set forth in 36 CFR 60.6.

In accordance with 36 CFR 63, the Ukiah District Office will transmit all necessary documents to the Secretary of the Interior for a determination of eligibility. If the Secretary concludes that the sites are eligible for listing in the *National Register,* the Ukiah District will formally nominate the sites within two years.

VISUAL RESOURCES

The public lands in SYU 13 cover a variety of landscapes which include steep to rolling terrain with oak woodland, grass, chaparral, redwood, mixed conifer, and hardwood vegetation. There are also narrow stream gorges and broad valleys. Individually, the blocks of public land tend to be those with low scenic quality. However, in many cases they are integral parts of larger landscapes of great beauty and scenic value.

Using the BLM visual resource management (VRM) system, most of the public lands have been evaluated and placed in management classes. The management classes provide management objectives and allow for varying degrees of modification in the basic landscape visual elements. The key factors considered in the evaluation were the inherent visual quality of the landscape, the viewing distance, the attitude of viewers toward visual change, and the number of viewers. The management classes and guidelines are shown in Appendix 3-7. Due to the scattered pattern of small tracts of public land in SYU 13, it is not feasible to include a map showing the VRM classes. This information is available in the Ukiah District Office.

Most of the lands subject to the proposal and alternatives are remote lands rarely seen by the general public, and few have high scenic values. Most of these lands are included in the least restrictive management classes. Those lands adjacent to components of the California Wild and Scenic Rivers

System, those near communities and residential areas, and those viewable from major highways are considered sensitive and are placed in the more restrictive management classes.

WILDERNESS

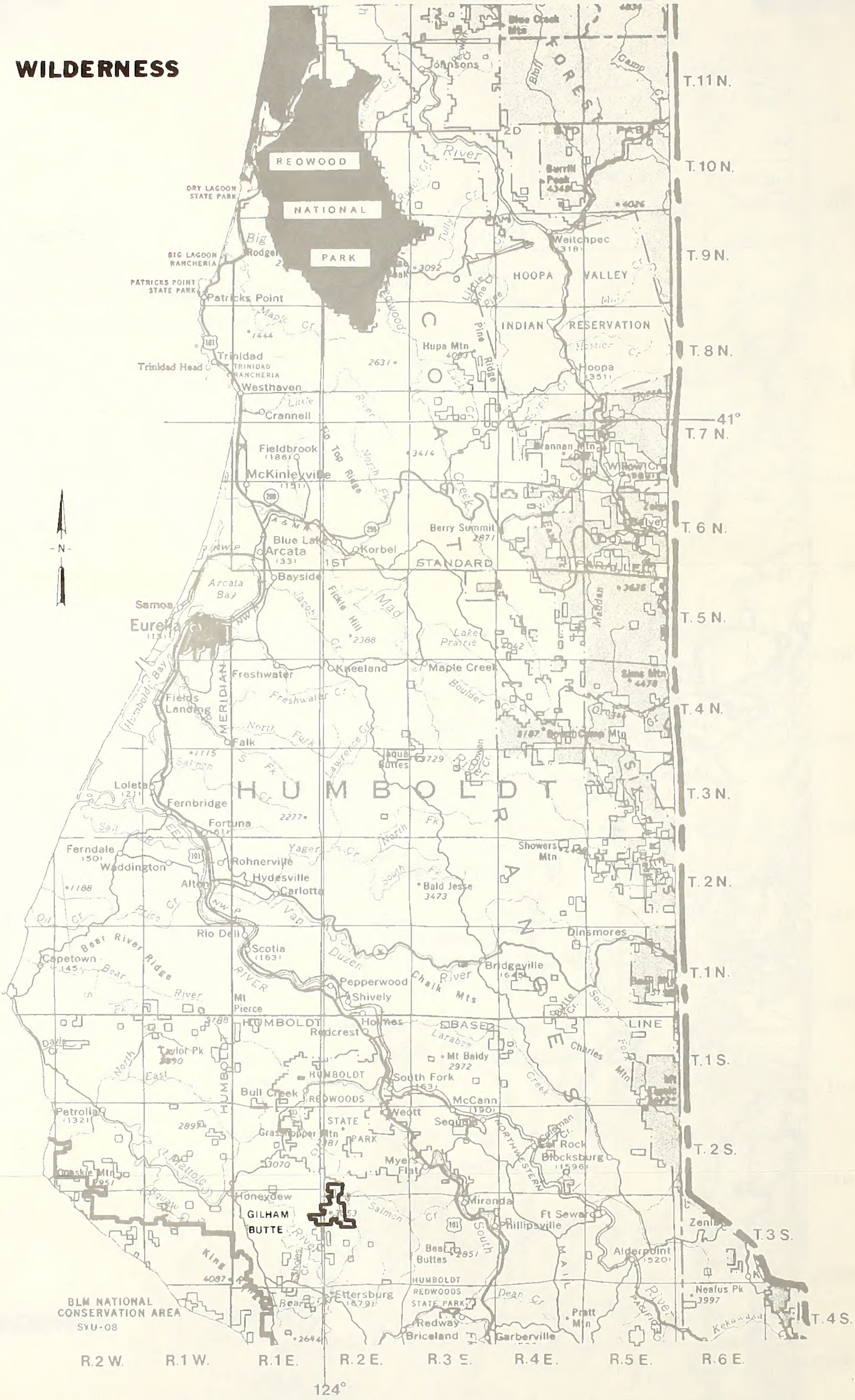
Section 603 of the Federal Land Policy and Management Act of 1976 (FLPMA) requires BLM to review all public lands to determine areas with wilderness characteristics as described in Section 2(c) of the Wilderness Act of 1964 and to recommend these areas to Congress as suitable or nonsuitable for preservation as wilderness. Congress makes the final wilderness designations.

To accomplish the mandate of Section 603 of FLPMA, BLM has developed a framework for the wilderness program covering inventory, study, reporting to Congress, and interim management. The inventory first identifies all roadless lands of 5,000 acres or more, then determines which of these areas have wilderness characteristics and designates them as Wilderness Study Areas (WSAs). Each WSA is studied through BLM's land use planning system and a recommendation reported to Congress. The BLM is required, in FLPMA, to manage identified WSAs so as not to impair their suitability for wilderness designation until Congress designates such areas as wilderness or denies designation.

In 1979 a wilderness inventory was conducted on all public lands within the area covered by this environmental impact statement. Eight roadless areas of more than 5,000 acres and one of less than 5,000 acres were identified on lands within SYU 13 and received intensive inventories to evaluate their wilderness characteristics (Map 3-5). The remaining scattered parcels were determined to clearly and obviously not possess wilderness characteristics and were released on August 16, 1979, from the interim management restrictions imposed by Section 603 of FLPMA.

In December 1979, after public meetings and comment periods, three of the nine areas receiving intensive wilderness inventories were designated as wilderness study areas by the BLM California State Director (Map 3-5). Following a public protest period, the State Director's decision became final on February 6, 1980, on the Red Mountain (6,173 acres) and Thatcher Ridge (17,187 acres) WSAs and on two of the areas not designated WSAs (Scotts Creek and Gilham Butte). The Big Butte WSA (9,548 acres) and four of the non-WSAs (Elkhorn Ridge, Brush Mountain, Cahto Peak and Brushy Mountain) received formal protests and will remain under wilderness interim management until a decision is made on each protest and the appeal process is exhausted by the public. Once decisions are final, WSAs will be managed under wilderness interim management policies and guidelines to prevent their impairment for potential wilderness

WILDERNESS



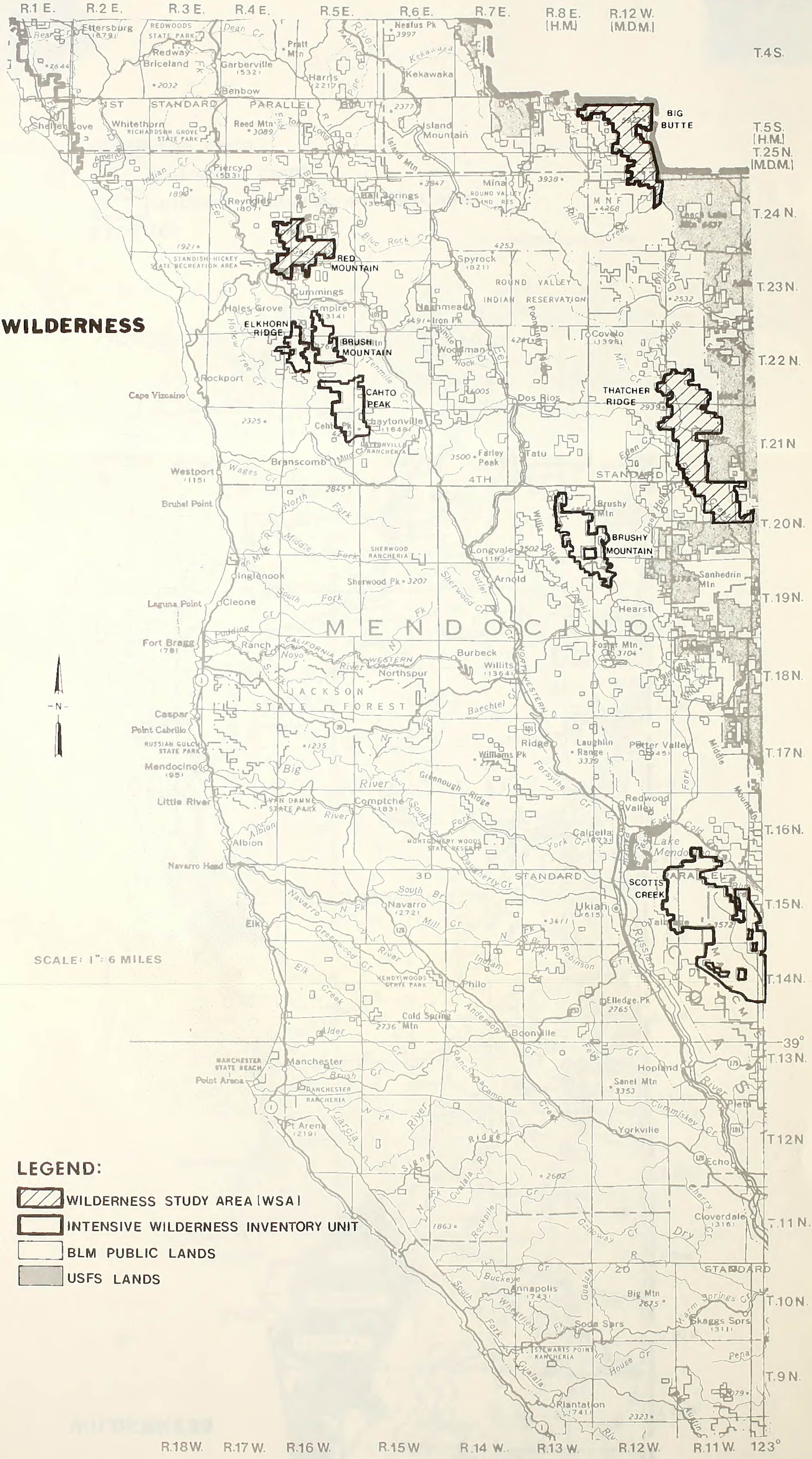
SCALE: 1": 6 MILES

LEGEND:

- INTENSIVE WILDERNESS INVENTORY UNIT
- BLM PUBLIC LANDS
- USFS LANDS

MAP 3-5 (NORTH)

WILDERNESS



SCALE: 1" = 6 MILES

LEGEND:

- WILDERNESS STUDY AREA (WSA)
- INTENSIVE WILDERNESS INVENTORY UNIT
- BLM PUBLIC LANDS
- USFS LANDS

MAP 3-5 (SOUTH)

designation until studies are completed and determinations made by Congress. The non-WSAs will return to other multiple-use considerations.

The Big Butte WSA is currently involved in a joint land-use study with the U. S. Forest Service. This study, along with a wilderness suitability recommendation, is scheduled to be completed by the end of calendar year 1980. Regardless of the land allocation decision made, the designated WSA will remain under wilderness interim management until Congress acts on the wilderness recommendation.

Procedures for BLM's wilderness inventory and permanent documentation files for all areas receiving intensive evaluation of wilderness characteristics are filed in the BLM Ukiah District Office.

LAND USES

Although SYU 13 includes several counties, discussions on land uses will focus on Humboldt and Mendocino counties because most of the productive forest lands are located in these counties. The productive forest land located in the southwest corner of Trinity County is associated with Mendocino County because of the present and anticipated transportation network.

Table 3-5 indicates that 22 percent of Humboldt County and 17 percent of Mendocino County are publicly owned.

Table 3-6 indicates that 80 percent of the two-county region is composed of forest lands, and 67.5 percent of the region's land is either commercial forest or productive reserve (productive forest land not managed for timber production, such as parks and wilderness areas).

Forty-six percent of the total commercial forest area is in private ownership, 33.3 percent is owned by the forest industry, 13.3 percent is public forest managed by the U. S. Forest Service, 2.4 percent is public forest managed by the BLM, and 5 percent is "other public," which includes areas managed by the State and the Bureau of Indian Affairs (Table 3-7). Twenty percent, or 4,532,000 acres, of the region is nonforest lands, 10 percent is rangeland, 2.3 percent is cropland, 1.2 percent is pasture, and 0.6 percent is urban and built-up (Table 3-8).

There is no known agriculture on BLM public lands and no mining activities on BLM-managed productive forest lands within SYU 13.

Grazing is a minor activity on BLM-managed public land in SYU 13. However, grazing is a major activity on private land surrounding some BLM-managed

TABLE 3-5

PUBLIC LAND OWNERSHIP

	Humboldt	Mendocino	Region
Total County Land Area	2,286,720.00	2,244.480.00	4,531,200.00
Federal Ownership	436,132.81	310,488.87	746,621.68
State Ownership	59,037.01	73,843.44	132,880.45
County Ownership	7,618.73	5,586.98	13,205.71
Local Agency Owned *	2,546.86	2,714.71	5,261.57
Total Government Owned (acres/percent)	505,332.41/22.1	392,634.00/17.49	897,966.41/19.82

* Includes school districts, city ownership, and other special district ownership.

TABLE 3-6

AREA BY LAND CLASS
(Thousands of Acres)

	Humboldt	Mendocino	Region
Commercial Forest	1,701	1,304	3,005
Percent of County	74.4	58.1	66.3
Noncommercial Productive Forest Reserve	47	6	53
Percent of County	2.0	0.3	1.2
Noncommercial Unproductive Forest	102	469	571
Percent of County	4.5	20.9	12.6
Total Forest	1,850	1,779	3,629
Percent of County	80.9	79.3	80.1
Nonforest	437	466	903
Percent of County	19.1	20.7	19.9
Total Forest and Nonforest	2,287	2,245	4,532

TABLE 3-7

AREA OF COMMERCIAL FOREST LAND BY OWNERSHIP AND STAND SIZE
(thousands of acres)

NATIONAL FOREST	Sawtimber		Other			Total Ownership Category	% of Commercial Forest Area	% of Total County
	Old	Young	Pole Timber	Sapling	Non-Stocked			
Humboldt[a]	168	87	10	21	6	292	17.2	12.8
Mendocino[b]	68	28	4	5	2	107	8.2	4.8
Region	236	115	14	26	8	399	13.3	8.8
BLM[c]								
Humboldt	17	6	0.5	0.5	5	29	1.7	1.3
Mendocino	26	9	0.6	0.6	8	44	3.4	2.0
Region	43	15	1.1	1.1	13	73	2.4	1.6
OTHER PUBLIC								
Humboldt	43	35	3.5	14.5	1	97	5.7	4.2
Mendocino	21	23	4.4	4.4	1	54	4.1	2.4
Region	64	58	7.9	18.9	2	151	5.0	3.3
FOREST INDUSTRY								
Humboldt[a]	179	232	5	82	33	531	31.2	23.2
Mendocino[b]	119	231	5	114	-	469	36.0	20.9
Region	298	463	10	196	33	1,000	33.3	22.1
OTHER PRIVATE								
Humboldt[a]	115	383	47	158	49	752	44.2	32.9
Mendocino[b]	42	364	42	163	19	630	48.3	28.1
Region	157	747	89	321	68	1,382	46.0	30.5
TOTALS								
Humboldt[a]	522	743	66	276	94	1,701	100.00	74.4
Mendocino[b]	276	655	56	287	30	1,304	100.00	58.1
Region	798	1,398	122	563	124	3,005	100.00	66.3

a. Oswald, 1968.
b. Oswald, 1972.
c. 1974 Extensive Inventory - BLM.

TABLE 3-8

Area of Nonforest Land
(thousands of acres)

	Humboldt	Mendocino	Region
CROPLAND			
Area	70	33	103
% of Nonforest (SCS)	17.7	10.5	14.5
% of County	3.1	1.5	2.3
PASTURE			
Area	28	25	53
% of Nonforest (SCS)	7.1	7.9	7.5
% of County	1.2	1.1	1.2
RANGE			
Area	251	217	468
% of Nonforest (SCS)	63.5	68.9	65.9
% of County	11.0	9.7	10.3
URBAN AND BUILT UP			
Area	20	8	28
% of Nonforest (SCS)	5.1	2.5	3.9
% of County	0.9	0.4	0.6
OTHER[a]			
Area	26	32	58
% of Nonforest SCS)	6.6	10.2	8.2
% of County	1.1	1.4	1.3
SCS Total[b]	395	315	710
USFS Total[c]	437	466	903
County Total	2,287	2,245	4,532

a. Includes small water areas and non-Federal rural land which is not classified cropland, pasture, range or forest land.

b. Difference between Soil Conservation Service and Forest Service is definitional.

c. Oswald (1968); Oswald (1972); Bolsinger (1976); Wall (1978).

Source: EDAWinc, Eel River Basin Resource Analysis, 1979.

parcels. There are currently only nine grazing leases for cattle and sheep on portions of the timber production base. These leases cover approximately 15,408 acres (not all timberland), and there are currently 2,131 animal unit months (AUMs) authorized.

Land Use Plans

Humboldt and Mendocino County plans and zones identify timber production and harvest in the BLM proposed timber sale areas as being of secondary importance. Unit 13 lands in the East Mendocino Planning Unit in Trinity County are designated "Resources." Zoning for this designation includes provisions for timber management and harvest. The Trinity County General Plan is approved and copies will soon be made available. Both Humboldt and Mendocino counties are presently revising their general land use plans.

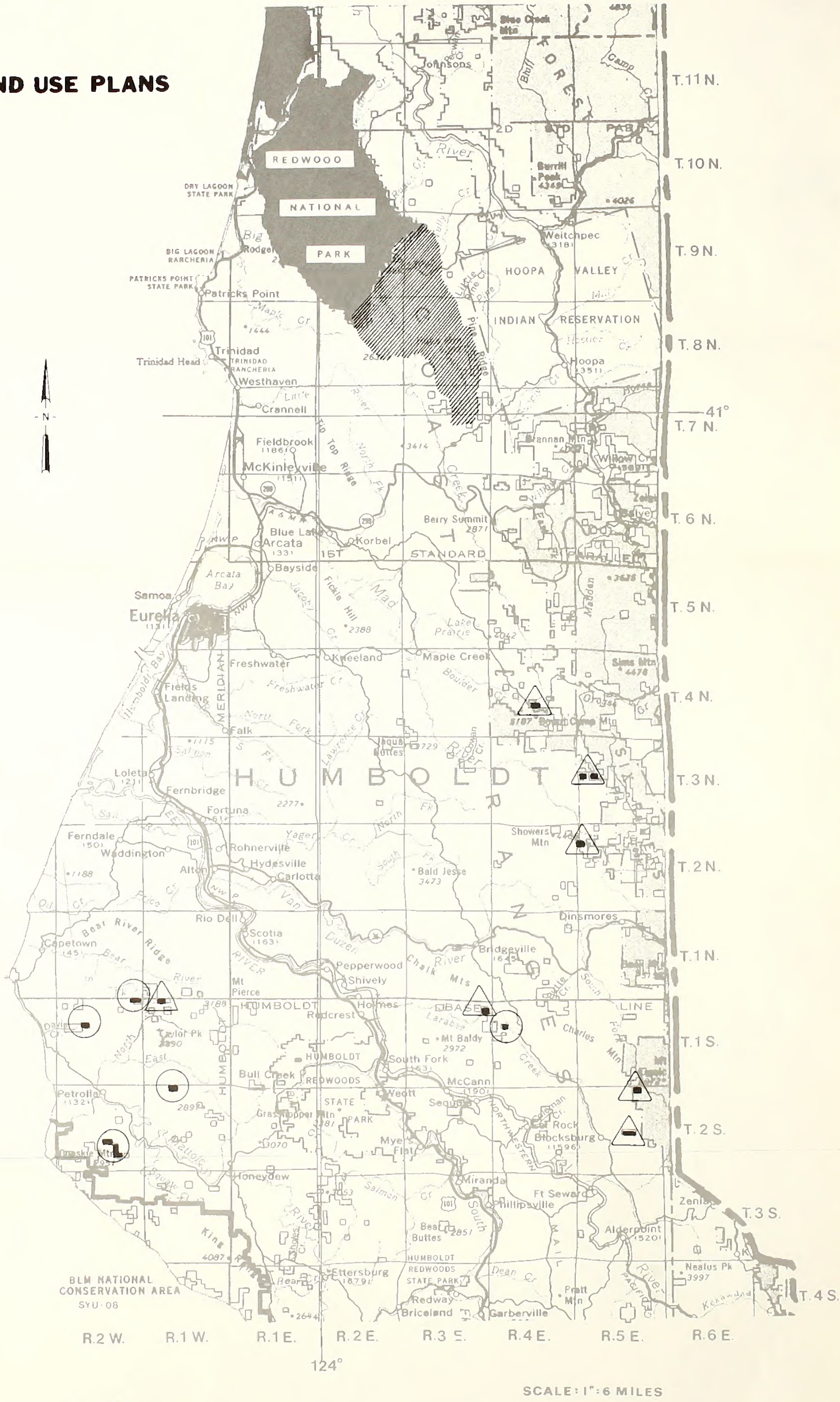
Public Law 95-250 mandates the National Park Service to monitor and control all actions that may affect further sedimentation in the Redwood Creek drainage. Approximately 2,400 acres of BLM-managed public land within the watersheds of the Redwood National Park fall within the "park protection zone" (Map 3-6). The park plan requires a review of all timber sale layouts to incorporate their specific recommendations and mitigations.

A number of BLM-managed tracts in SYU 13 are included in ongoing exchange actions in support of the BLM King Range acquisition program (Map 3-6). Exchange of lands to support the King Range Act (P. L. 91-476) could reduce the timber production base for SYU 13. The King Range Act requires private (offered) lands and public (selected) lands to be in the same county. SYU 13 lands in Humboldt County would be most affected, as the acquisition priority for King Range is in this county.

Transportation Network

The major transportation route in SYU 13 is U.S. Highway 101 which runs north and south and leads to the major timber processing areas of Ukiah and Eureka. Major east-west routes are State Highways 20, 36, and 299 (Map 3-7). Numerous county roads expand the transportation network, but very few public roads reach the public lands. Over 75 percent of the public land involved in SYU 13 does not have legal access for administration or public use. Although the BLM manages or controls over 130 miles of road in the SYU 13 area, most of this mileage is on public land and does not connect with a public road system.

LAND USE PLANS



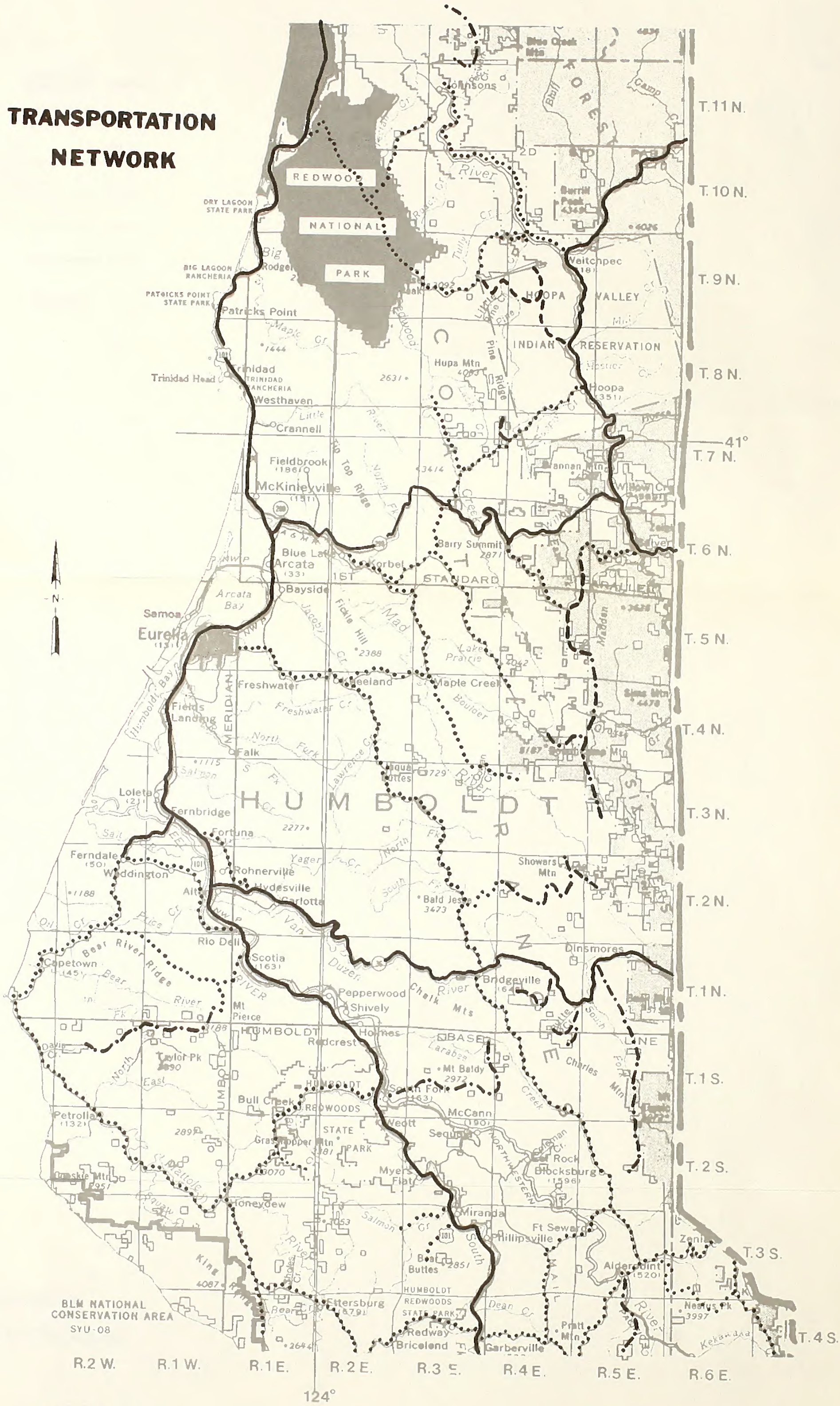
SCALE: 1" = 6 MILES

LEGEND:

- PRODUCTIVE FOREST LAND TRACTS INCLUDED IN CURRENT KING RANGE EXCHANGE PROGRAM.
- PRODUCTIVE FOREST LAND TRACTS NOT INCLUDED IN CURRENT KING RANGE EXCHANGE PROGRAM, BUT PROPOSED AS BEING AVAILABLE FOR EXCHANGE.
- REDWOOD NATIONAL PARK "PROTECTION ZONE".
- BLM PUBLIC LANDS
- USFS LANDS

MAP 3-6

TRANSPORTATION NETWORK



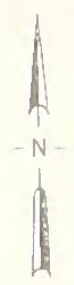
LEGEND:

SCALE: 1" = 6 MILES

- MAJOR PUBLIC ROADS
- SELECTED MINOR PUBLIC ROADS
- OTHER ROADS (BLM, USFS, BIA)
- PROPOSED ADDITIONAL ACCESS NEXT 10 YEARS (BLM, USFS)
- BLM PUBLIC LANDS
- USFS LANDS

MAP 3-7 (NORTH)

TRANSPORTATIO
NETWORK



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The roads controlled by BLM range in width from 14 to 20 feet. Most roads are unsurfaced and are not suited to heavy winter use. Very few of the roads receive regular maintenance and must rely on timber operators using the roads as permittees or contractors to perform maintenance only during the periods of their operations.

Private timber operators frequently request temporary right-of-way permits to cross public lands either on existing roads or to build new roads. The BLM retains control of the roads and stipulates the conditions of the rights-of-way.

SOCIOECONOMICS

The region of influence for the socioeconomic analysis will be confined to Humboldt and Mendocino counties. BLM manages very little timber in Del Norte, Sonoma, and other counties within SYU 13, and the timber available from public land in Trinity County will flow into Mendocino County because of the anticipated transportation network.

POPULATION

Humboldt County ranks 14th statewide in county size with 3,599.5 square miles, ranks 27th in county population with a 1977 population of 105,500, and ranks 25th in density with an average of 29.5 persons per square mile. Mendocino County ranks 15th in county size with 3,510.4 square miles, ranks 35th in population with 60,200 persons in 1977, and ranks 41st in density with 17.2 persons per square mile. The SYU 13 region comprises 4.5 percent of the land area in California with 0.8 percent of the State population. The average State population density is 137.4 persons per square mile. Residents of the two counties are considerably dispersed, with less than 50 percent of the population residing in incorporated areas. In contrast, approximately 90 percent of the State's population lives in urbanized areas.

In Humboldt County, the major population centers are Eureka, Arcata, and Fortuna. Arcata and Eureka are located around Humboldt Bay and serve as the regional trade centers for the North Coast. The timber, fishing, and tourist industries, and the government sector provide employment.

Humboldt's unincorporated population is 55 percent of the total. This population tends to be located on the fringes of the major population centers or in small towns situated along Highway 101. Highway 101 provides tourist access to the Redwood Park region and is a major access route for logging

trucks. Many of the communities along Highway 101 and in more isolated areas further inland developed around sawmills.

Between 1970 and 1977, population in Humboldt County remained fairly stable, growing at an annual average rate of 0.8 percent. This occurred in spite of a decline of more than 1,000 jobs in the lumber and wood products sector. Increases in employment in other sectors, principally government, trade, and services, offset some of the decline in population that would have followed these job layoffs. More people entered than left the county, suggesting an attraction to the area in spite of its limited employment opportunities and high unemployment rate.

Sixty-five percent of the population of Mendocino County lives in unincorporated areas, partly due to its heavy reliance on the agriculture sector for jobs. Ukiah, the county seat, is the regional trade center for the area. Except for small agriculture towns, communities in Mendocino County have developed either along the coast where the fishing and lumber industries can provide employment or further inland along Highway 101 where the tourist trade, the lumber industry, and government employment can support a local economy. Development has also occurred outside the city limits of Ukiah, Willits, and Fort Bragg.

Estimates for Mendocino County indicate a much larger increase in population between 1970 and 1977 than the State, which grew 1 percent annually. The average growth for the county was 2.8 percent annually. An increase in jobs in the government and services sectors accounted for some of the growth. However, the growth in Mendocino County cannot be fully explained in terms of expansion or employment opportunities. Some local residents have suggested that an influx of alternate life style individuals, attracted by climate and the rural nature of the county, has contributed to the population growth.

Regional Economy

The regional economy is largely based on resource extraction and/or development. Consumer spending does not flow predominantly in an internal spending cycle that generates local production and employment. A historical and current concentration in logging and lumber manufacturing has meant that there has been a substantial disparity between the goods and services produced locally and the total goods and services consumed. When the paper and allied products sector and furniture and fixtures sectors are considered, lumber and wood products employment accounts for 84 percent of Humboldt and 72 percent of Mendocino County's manufacturing employment. This compares with 0.5 percent for the State. Because few of the commodities consumed locally are produced locally, consumption goods must be imported into the region. Local spending therefore flows to other regions, and there is a constant leakage of purchasing power from the local economy. It follows that employment in the sector that

serves local residents, i.e., the residentiary sector, is largely dependent on income flows entering the region from outside. Such monies flow back into the economy in exchange for goods or services exported from the region (including expenditures of State and Federal agencies in the region) as private or public transfer payments (e.g., pensions and retirement, welfare, or unemployment income) and as expenditures of money earned outside the economy (e.g., investment income, or money spent by tourists or students.)

Unemployment and Employment

Both Humboldt and Mendocino counties have experienced much higher unemployment rates, 13.1 percent and 9.2 percent respectively, than the State at 7.8 percent. Unemployment rates in Humboldt County have been consistently higher than in Mendocino County.

The overall high level of unemployment in Humboldt and Mendocino counties is due primarily to a decline in timber production that began in the late 1950s. A decline in the number of small, less labor efficient sawmill operations also contributed to reduced employment opportunities in the lumber and wood products sector.

Both Humboldt and Mendocino counties are dependent on highly seasonal jobs. Seasonal variations in unemployment rates range from 10.9 to 16.2 percent in Humboldt County and from 6.1 to 13.3 percent in Mendocino County. Agriculture, fishing, tourism, and lumber industry are the predominant job market. Each reaches its peak operating level between May and October. Seasonal fluctuations in the lumber industry are due mainly to logging operations that cease during the winter months due to adverse weather conditions. Lumber mills, however, frequently store sufficient logs in inventory to permit year-round operations. These employment sectors also fluctuate from year to year based on such externalities as weather, housing starts, and the price of fuel.

Employment in the lumber and wood products sector is 17.9 percent of the total employment in Humboldt County and 18.1 percent of the total employment in Mendocino County. This is much higher than the State, which is 0.1 percent. (See Appendix 3-8 for "Wage and Salary Employment by Industry.")

This unusually large dependency on the lumber and wood products sector creates two problems: (1) cyclical swings in timber demand that are magnified in the Humboldt County area, and (2) variations in timber production due to local causes (e.g., seasonality, timber shortages, or productivity changes) that have a major impact on the well-being of the regional economy.

For Humboldt County in particular, the importance and subsequent decline of the forest products industry has been well documented. From 1955 to 1975

ensured lumber employment declined at an average annual rate of 2.8 percent. From 1964 to 1975 the annual decline was 2.5 percent. From 1975 to 1978 the annual decline averaged 1.8 percent. It can be seen that the downward trend continues but at a slower rate. In Mendocino County the lumber and wood products sector has remained fairly stable from 1972 to 1978 with an average annual increase of 0.5 percent.

Employment in the lumber and wood products manufacturing sector is correlated to the annual timber production but does not appear to be directly proportionate. Employee work hours are more sensitive to timber production because the industry is likely to shorten or lengthen work hours considerably before either terminating or hiring employees.

Most of the region's log consumption is by sawmills. In 1976 there were a total of 40 sawmills in Humboldt (28) and Mendocino (12) counties with a total capacity of 5.79 million board feet (MMBF) per day, or an average capacity of 0.145 MMBF per day per mill. Production of the sawmills in the region in 1976 was 27.9 percent of the capacity.

In 1976 the forest industry and other private owners in the North Coast (which is made up of Humboldt, Mendocino, Del Norte, and Sonoma counties) provided 83.5 percent of the logs to sawmills. The private sector also dominated veneer and plywood mills (81.9 percent) (Hiserote and Howard 1978).

Significance of BLM-Managed Timber

In the public sector, BLM contributed an annual average of 0.6 of 1 percent of the regional timber production from 1969 through 1977. In perspective, the Six Rivers and Mendocino National Forests, which are also in the public sector, contributed an annual average of 6.2 percent to the two-county region (Appendix 3-9).

The nine companies that have recently purchased BLM timber employ from 108 to 1,655 persons and had a 1977 timber production ranging from 20 MMBF to 183 MMBF.

The Centaur study (1978) concludes that the average contribution of BLM timber to the companies that have bought BLM timber is 1.3 percent of the companies' total timber production. The same study indicates that 67 jobs are dependent upon the sale of BLM timber; 0.6 of 1 percent of the total lumber and wood products work force of 10,575 in Humboldt and Mendocino counties in 1977.

Socioeconomic Concerns and Values

Major socioeconomic concerns in Humboldt and Mendocino counties are described in each county's annual reports for the Overall Economic Development Program (OEDP). Similar concerns and goals are listed in general plans and related documents.

In Humboldt County, the major issue has been the dependence on one industry, forestry and forest products, and the industry's cyclical, seasonal, and now declining activity. Residents have been able to cope with the cyclical, seasonal nature of forestry through longer working hours, contract payments or other income, or leisure during the winter. Most have also enjoyed a nonurban lifestyle with generally lower living costs. While such generalizations may be disputed as a description of the past, some recent events, among them the Redwood National Park expansion and the cutback in Forest Service sales because of litigation, have made residents more apprehensive about future accommodation to economic change. The more critical economic concern is no longer cyclical or seasonal employment, but the long-term decline of the forest industry despite higher statewide and national demand for wood products.

There is consistent polarity in the region between conservation/environmental groups and industries such as logging and mining. The conflict results from differences in values regarding land use. Those whose employment and income depend on resource production and use are opposed to the withdrawal of any lands which are useable, no matter how few consumptive resources the lands may contribute. Conservation and research groups, on the other hand, are concerned that resource uses, such as logging and mining, will alter the land in such a way that soils, vegetation, wildlife, and primitive recreation values will be destroyed.

There is also the difference in philosophical values between those who feel the earth is for the use and convenience of mankind and those who feel that other life forms are valuable and it is man's responsibility, as the present dominant species, to not cause the destruction of other species.

Public Attitudes and Expectations

During Mendocino County's general planning process, policy recommendations were submitted to the planning department by the public. The Mendocino County Board of Supervisors has not adopted any of these recommendations; however, it is felt that these reflect the public's concern about the county's timber resources.

Humboldt County does not have comparable public comments at the present time, but it is likely that the concerns are very similar.

In summary, the public deems it desirable to protect and maintain the commercial timberlands. The public land agencies are encouraged to manage their resource production on a sustained-yield basis which will provide a stable local economy.

Public attitudes and expectations specifically related to BLM land use and management can be found in the "Ukiah District Planning Area Analysis." Those concerns which are felt to relate directly to this document are summarized below.

Access to public lands is a recurring issue. Some feel that in order to manage for multiple use, public access is mandatory. On the other hand, access would require costly road maintenance and may result in increased trespass on the private lands through which the access passes. The private landowners are generally strongly opposed to public access because of the potential trespass problems. They usually have no problem with allowing access for timber harvesting and resource management, although there are those who oppose any type of access.

The logging of public land is quite controversial. There are those who feel that the BLM lands with old-growth vegetation should be left because of their unique ecosystem, especially since this ecological system is being lost by logging on other lands. There are also those who feel that as the private lands with timber are being subdivided, the public lands must be used to make up the otherwise lost timber supply. Due to the expansion of the Redwood National Park and the conversion of mills to small-diameter capabilities, the public timber is likely to become more valuable. The public expects the BLM and USFS to require sound logging practices when selling timber, especially on southwest slopes. The public also feels that logging should be practiced in a manner that promotes sustained yield and does the least damage to the soil and wildlife.

4

ENVIRONMENTAL CONSEQUENCES

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

Chapter 4 describes and analyzes the environmental, social, and economic consequences of the proposed action and alternatives. Emphasis is on the critical issues identified during the scoping process, with more cursory analysis of less critical issues.

Both beneficial and adverse impacts are discussed over the short and long terms. Unless otherwise specified, short-term is defined for the purpose of this analysis as the 10-year period of the timber management plan. Long-term is not specifically defined because of the variability of the needs of different resources in analyzing long-term impacts. For example, long-term impact analysis for soil productivity may be significant for several hundred years, while long-term analysis for visual resources may be significant for only several decades.

The following assumptions were made as a basis for analysis:

1. The proposed action and alternatives would be implemented exactly as described in Chapter 2 and in accepted management framework plans (MFPs). Actions not specifically described or referred to in these documents are not part of the proposed action and alternatives.

2. Mitigations that are accepted by management are considered part of any alternative and are included in Chapter 2. Impacts remaining after application of these accepted mitigation measures are described as "Unavoidable Adverse Impacts" in Chapter 4.

3. Mitigation measures that are not acceptable due to funding and manpower constraints or that require further analysis are entered as "Other Possible Mitigation" in Chapter 4.

Analysis indicates that there would be no significant impacts on climate, air quality, noise, geology, topography, paleontology, and grazing. There will be no further discussion of these categories.

PROPOSED ACTION

Soils

Basically, it is not the temporary elimination of trees in a timber harvest operation that causes the damage, but the improper techniques used in the removal of the trees and in road construction (Klock 1976). Poor logging practices in the past have caused severe damage to soils and the watershed.

Construction of roads and landings would be the primary source of erosion, and other logging activities, such as yarding and slash disposal, would cause additional erosion. Activities such as tree planting, grass and animal control, and fertilization would cause little or no soil erosion.

Soil particles detached during a hillside mass movement or other erosion process may or may not be transported immediately to a stream or ocean. Most often they are moved only part way down the hill, where they are deposited. They may be picked up by a subsequent storm and moved further. This sequence may be repeated a few or many times before the particle reaches a stream and becomes sediment (Dodge et al. 1976). A study of Casper Creek Watershed (Rice et al. 1979) indicated that about 22 percent of the eroded material had left the watershed.

ROAD CONSTRUCTION AND MAINTENANCE

Road construction is recognized as a major cause of sheet and gully erosion and mass wasting in Northern California (Rice 1979b; USDA 1972; Anderson, undated). Road design, location, geology, and topography all have a great effect on erosion and landslides. Otherwise stable slide masses can sometimes be triggered by undercutting.

Rapid sediment production during high rainfall and peak runoff conditions on logged-over areas can disrupt stream equilibrium by changing gradients, causing rapid aggradation (downcutting), streamside sliding, and bank erosion. Studies have shown that secondary all-weather roads (14 to 16-foot width) have the lowest erosion rate per mile of right-of-way. This is probably due to good design, surfacing, drainage, and conforming more closely to the terrain than the higher standard roads (Rice 1979b). Streamside roads are more of a hazard to sedimentation than roads upslope (Anderson, undated). Ridgetop roads experience only minor erosion, estimated to be 50 percent less than roads on slopes (Rice 1979b; Anderson, undated).

Even a fully benched road inevitably upsets the balance of forces within the soil mantle. Building a road in an unstable area constitutes a calculated risk, no matter how well the road is designed and constructed to minimize damage (Fredricksen 1963).

Mass wasting (mostly slides and slumps) and surface sloughing (dry ravel and very minor rills) are the principal types of erosion from road construction. Their occurrence is more frequent where roads intersect stream channels, even those high on the watershed.

An estimated 57 miles of new road construction and 94 miles of reconstruction would be necessary under the proposed action. Approximately half of the construction and reconstruction would be on ridgetops. The remainder would be mostly on midslopes, with only minor amounts of lower slope or valley road disturbance. The erosion rate for the undisturbed or natural lands in SYU 13 is approximately 1 ton per acre per year. Road construction would increase this to from 5 to 49 tons per acre per year on the disturbed areas. Construction of the proposed logging roads would increase erosion on the road right-of-way to as much as 465 tons per mile (Table 4-1) (Rice 1979b). Approximately 22 percent of the total erosion would come from the road network, while the rest would come from the harvest area.

Most of the erosion on roads would occur the first two to three years after construction. The erosion rate would continue to decline until the tree roots decay, which could cause a temporary increase. Routine maintenance can significantly reduce soil erosion by taking care of small problems before they become large. Culvert and drainageway cleaning, removal and proper disposal of mass wasting, and correct road grading should have a beneficial effect on erosion caused by road construction.

SHELTERWOOD CUTTING

Compared to clearcutting, the two-stage shelterwood silvicultural system, which leaves an overstory of between 30 and 50 percent canopy cover, would have a beneficial impact on soil moisture and temperature. Compared to no disturbance, there would be adverse impacts. Available research literature indicates soil moisture is the most limiting factor in the survival and growth rate of seedlings on most soils (Hallin 1967). Loss of soil moisture is through evapotranspiration by plants and direct evaporation from the soil surface. Factors involved in the rate of evaporation are influenced by soil surface temperature, solar radiation, humidity, and wind. Studies also indicate soil moisture is consistently higher in clearcut units than in partial cut or uncut control units. Although moisture in the entire soil profile is adequate for established fir, under clearcut conditions the soil moisture in the surface 8 inches (the planting depth of 2-year old bare root stock that has not been transplanted) may be less than necessary for seedling survival.

Other studies on soil temperatures found that deerbrush 2 feet high and 2 feet across reduced soil temperatures by at least 50°F. Depending on the influence of elevation, slope, aspect, shade, and time of day, soil temperatures may reach or exceed 180°F. Lethal temperatures to emergent seedlings varied

TABLE 4-1

EROSION DUE TO ROAD CONSTRUCTION AND RECONSTRUCTION (Tons)
(10-Year Period)

PROPOSAL	LOCATION								TOTAL
	Ridgetop		Midslope		Lower Slope		Valley		
	Miles	Tons	Miles	Tons	Miles	Tons	Miles	Tons	
Construction									
Public Land	17	510	19	5890	3	1395			7795
Private Land	11	330	7	2170	-	-	-	-	2500
Reconstruction									
Public Land	9	70	11	825	-	-	-	-	895
Private Land	30	240	33	2475	4	500	7	420	3635
TOTAL EROSION (Tons)		1,150		11,360		1,895		420	14,825

from 125° to 150°F. Best first season growth occurred at 50 to 70 percent of full light (Hallin 1968). Therefore, it is probable that subsequent cutting in the stand would always leave an overstory of sufficient shade for good seedling survival.

The two-stage shelterwood harvest system would help maintain slope stability. Live tree roots within the soil and/or fractures or joints in underlying bedrock anchor the soil mass. Within 3 to 5 years after timber harvest, this slope binder is destroyed as stump roots decay. By leaving an overstory of 30 to 50 percent canopy cover, mass movement would be reduced. Root growth by young trees would be sufficient in 10 to 15 years, after the remaining old-growth is harvested, to substantially reduce mass movement. In a study by Burroughs and Thomas (1977), it was found that Douglas-fir roots 1/16 to 3/8 inch in diameter are most effective in increasing the stability of timbered slopes.

YARDING

Any activity causing surface disturbance on steep slopes would have an effect on erosion rates. Yarding disturbs the litter and surface soil, causes compaction, and obstructs drainage channels with logging debris. The effects of logging may accelerate erosion throughout a drainage system at sites well removed from the logging activity. Great variations in erosion rates can be found. In the coast district, erosion ranged from none to 4,438 tons per acre per year on areas clearcut and selectively cut using cable yarding and tractor skidding (Dodge et al. 1976). Generally, the steeper the slopes, the greater the potential for erosion.

A number of studies have concluded that the most important determinant of erosion and disturbance is not variation in site condition, but a difference in operator performance. Other important considerations are the yarding method used and the magnitude of storms actually experienced following harvest (Rice and Sherbin 1977).

Present erosion rates on these undisturbed lands are .6 to 1.2 tons per acre per year (Table 4-2). Yarding would increase erosion rates to from 3.0 to 8.0 tons per acre per year.

TABLE 4-2
ESTIMATED AVERAGE TONS PER ACRE OF EROSION
UNLOGGED AND LOGGED AREAS

	SLOPE		
	35%	35-70%	70%
Unlogged	.6	1.0	1.2
Logged			
Cable	3.0	4.0	4.8
Tractor	8.0	--	--

Major amounts of accelerated erosion would occur at a decreasing rate over the following 4 to 10 years. The time required for the site to return to near prelogging erosion levels would be variable. Slope, aspect, soil, amount of disturbance, etc., would all interact to affect time of stabilization.

Yarding would cause some soil compaction, even though these skeletal soils with a profile high in percentage of rock fragments are often considered resistant to compaction. Most of the compaction in the tractor-logged units of the proposed action would be on skid roads where the surface soil has been stripped off and bare soil compacted by the passage of tractors. Cable-logged areas would be compacted by the skidding of logs. Compacted areas are usually in shallow troughs or furrows and may be at least partially covered by scattered litter and slash. An Oregon study (Dyrness 1965) showed tractor-logged areas had 27 percent of the area compacted while high-lead units had only 9 percent.

PLANTING

The planting of poorly stocked or nonstocked logged areas, site conversion areas, and timber stand improvement (TSI) areas would reduce long-term erosion and sediment. An increase in ground cover (living or dead plant materials) would reduce raindrop impact erosion, overland water flow, and dry raveling (Dodge et al. 1976).

Tree seedling root penetration would help reduce the chance of mass wasting by anchoring the soil mass. Small roots less than 0.5 inch in diameter are the most effective in increasing stability of timbered slopes (Burroughs and Thomas 1977).

SLASH DISPOSAL AND SITE PREPARATION

Erosion from gross yarding of unmerchantable logs and any scarification needed for site preparation is included in the total erosion shown in Table 4-3. Burning would be done primarily on landings, with only minor spot burning elsewhere. Erosion would be of little consequence.

TABLE 4-3

TOTAL TONS OF EROSION BY SLOPE CLASS AND YARDING SYSTEM
(Based on 4 years for sites to return to prelogging erosion)

	SLOPE		
	35%	35-70%	70%
Cable	--	19,215	8,310
Tractor	24,405	--	--

SITE CONVERSION AND TIMBER STAND IMPROVEMENT

Generally, hardwood conversion, thinning, and brush removal would be done concurrently with timber harvest. Most of the hardwood conversions planned for the 10-year period are within harvest areas. With the exception of one 117-acre harvest area, all erosion would be comparable to that caused by yarding.

Timber stand improvement (TSI) is proposed on 323 acres. There would be no yarding or other surface disturbing activities. This work would have little effect on slope stability. There would be a decrease in canopy cover, but an increase in ground cover from felled trees should offset the reduction. Erosion rates would be similar to the undisturbed rate of .6 to 1.2 tons per acre per year.

FERTILIZATION

The proposed action would apply 200 pounds of nitrogen per acre on 75 acres in the form of urea granules. Fertilization should have a beneficial impact on soil productivity. Increased growth of young trees should reduce erosion from the site.

GRASS CONTROL

Chemical control on 135 acres of grass would, on a short-term basis, increase erosion by reducing ground cover. A reduction in plant cover gives less protection to the soil surface from raindrop impact erosion. Interplanted trees would soon increase the ground cover, and erosion eventually could be less than before grass control. Slope stability would be increased by the deep penetration of tree roots.

CONCLUSIONS

Under the proposed management plan, about 51,930 tons of soil could be eroded because of yarding and 14,825 tons by road construction and reconstruction. Most of the soil loss would be due to mass movement (slides and slumps),

surface sloughing, rills, and gullying. Site productivity would be only moderately affected because a high proportion of the total tons eroded is less productive subsoils and is not lost downstream but deposited downslope.

WATER

Timber harvest and associated silvicultural activities would have both positive and adverse impacts on the quality and yield of the water resource. Water quality may have an economic impact as great or greater than the impact from the timber resource. High quality water is important to the socioeconomic needs of Northern California because it allows such activities as pulp and paper processing, water-based recreation, steelhead and salmon fisheries, and a diverse riparian wildlife habitat.

The overall water resource of SYU 13 would be only slightly impacted by the proposal. However, individual or specific streams in the immediate area of logging could be severely impacted.

WATER YIELD

Flood peak flows and increased water yield would not be appreciably affected by partial timber cutting under North Coast conditions. Peak streamflow is more affected by antecedent moisture conditions (wet soil mantle) or rain-on-snow conditions than by runoff from cutover areas (Rothacher 1973). Peak flows would be significant only when at least 12 percent of a watershed is seriously compacted by road building or tractor operations (Harr 1975). On-site water yields would be increased by timber cutting under the proposed action, but on a river-basin-wide basis, this yield is considered insignificant (Harr 1975).

The most significant impact on streamflow after partial cutting is the increased baseflow on smaller mountain streams. This increase would last longer through the dry summer season (Rothacher 1970). This post-harvest condition, if water quality can be protected, is very beneficial to the fishery in mountain streams. Any such beneficial changes are temporary, at best, since the precutting streamflow regime would return as the stand recovers and the basal area returns to the prelogging stocking rate. Peak flows that scour mountain stream channels are commonly due to debris dams, culvert failures, or dams formed by landsliding directly into upstream channels.

WATER QUALITY

Primary water-quality issues include sediment yield as a result of surface erosion, mass wasting or channel cutting, increased water temperatures, reduced dissolved oxygen, entry of forest chemicals into the stream

system, and disruption of the normal nutrient cycling process in the forest. All are interrelated. Table 4-4 shows effects of the proposed action and alternatives on increased water yield and the corresponding reduction in water quality as expressed by increased sediment yields.

Sediment Yield

On North Coast California lands administered by the BLM for sustained timber management, the normal sediment yield would vary from 29 to 58 tons per square mile per year from undisturbed forest land, depending on slope (Table 4-5). Aspect, vegetation cover, soil type, geology, and rainfall intensity also affect sediment yield but were unquantifiable under the proposal. When areas are disturbed by roads, skidding, and related activities, the sediment yields increase to about 222 tons per square mile per year. The 4,220 acres of tractor and cable yarding under the proposal would produce an estimated 5,710 tons of sediment before the area would recover. Data on estimated sediment yields throughout the North Coast are adapted from various sources (Dodge et al. 1976, Hauge 1977, Rice 1979a and 1979b, and USDA 1970 and 1972).

Construction, reconstruction, and maintenance of the 151 miles of roads under the proposal would contribute 1,630 tons of sediment during the first 5 to 10 years after harvest, depending on how well the exposed soil is revegetated. Seventy-five percent of this sediment would be caused by new construction. Ridgetop roads do not cross streams or small channels and therefore result in the least sediment yield. Valley roads that are close to or cross stream channels cause 80 times more sediment yield than that of ridgetop locations. Roads located well away from channels (including perennial, intermittent, or ephemeral water courses) yield less sediment because of the filtering effect of the forest floor. Roads which inadvertently undercut slopes through unstable areas also contribute heavily to sediment yield.

Increased Water Temperatures

Thermal pollution from the proposal would be a minor temporary problem because of the suspended sediment and reduced shade caused by logging. There could be an increase in stream temperature even though there are stream buffer zones. Construction of road crossings could cause a water temperature increase of 7° to 13°F higher than in undisturbed areas (Brown 1978).

Chemicals

The proposal includes the application of herbicides and nitrogen fertilizer to small areas. Washing by rainwater, leaching, or wind drift could spread these chemicals into adjacent areas or streams. Organisms not targeted to receive these chemicals would be affected. For example, high-nitrogen fertilizers are readily leached into ground water to enrichen or contaminate channel springs that form the baseflow of mountain streams.

TABLE 4-4

PREDICTED INCREASED WATER YIELD COMPARED TO REDUCED WATER QUALITY (SEDIMENT YIELD) 1/

PER DECADE	PROPOSED ACTION	NO ACTION	LIMITED INVESTMENT	ACCELERATED HARVEST #1	ACCELERATED HARVEST #2	MANAGED OLD-GROWTH
Timber Production Base (Acres)	48,682	54,247	48,682	48,682	48,682	48,682
Roads (miles)	151	133	115	157	219	134
(acres)	642	565	489	667	931	570
Increased Water Yield (ac. ft. / 20 years)	1,800	1,580	1,370	1,870	2,610	1,600
Increased Sediment Yield (ac. ft. / 10 years)	.9	.8	.7	1.0	1.4	.9
Timber Harvest (acres)	4,220	3,352	2,784	4,574	6,421	3,557
Increased Water Yield (ac. ft. / 20 years)	5,910	4,690	3,900	6,400	8,990	4,980
Increased Sediment Yield (ac. ft. / 5 years)	3.3	2.6	2.1	4.1	5.5	2.1
Site Conversion (acres)	483	22	0	483	645	455
Increased Water Yield (ac. ft. / 20 years)	675	31	0	675	903	637
Precommercial Thinning (acres)	443	0	0	443	443	443
Increased Water Yield (ac. ft. / 20 years)	620	0	0	620	620	620
Grass Control (acres)	135	0	0	135	135	135
Increased Water Yield	0	0	0	0	0	0
Total Predicted Increases 2/						
Water Yield (ac. ft. / 20 years)	9,005	6,301	5,270	9,565	13,123	7,837
Sediment Yield (ac. ft. / 10 years)	4.2	3.4	2.8	5.1	6.9	3.0

1/ Increased sediment yields reflect a corresponding change in other water quality parameters such as increased stream temperatures, reduced dissolved oxygen levels, dissolved or suspended chemicals, and flush of nutrients caused by disruption of the normal forest nutrients cycle.

2/ Increased water yields are assumed to reduce to zero after 20 years of vegetative recovery; increased sediment yield is assumed to reduce to zero after 10 years on roads and landings and 5 years in the logging areas. But many external factors interact to alter the true values of these predictions such as poor erosion control practices which could continue the erosion cycle for 30 years and more.

TABLE 4-5

Erosion and Sediment Yield--Unlogged Lands

(Per Year)

	<35% Slope	35-70% Slope	<70% Slope
EROSION			
Tons/Acre	.6	1.0	1.2
Tons/Square Mile	384	640	768
SEDIMENT			
Tons/Acre	.05	.08	.09
Tons/Square Mile	29	49	58
Acre Feet/Square Mi.	.018	.029	.033

Delivered Sediment Yield: 11% of total erosion.

Sources: USDA 1970, 1972; Rice et al.1979; Rice 1979a, 1979b.

Nutrient Cycling

Silvicultural practices of the proposal could change the rate of nitrogen cycling (Figure 4-1) and the distribution of nutrients among vegetation, forest litter, and soil. Logging could cause nitrogen flux change by decreasing organic matter or by changing forest canopy and affecting throughfall water. Removal of large woody debris by gross yarding could reduce nutrient cycling, especially nitrogen (Franklin et al. 1979). Conversely, man-caused situations, such as logging or thinning, where excessive amounts of forest litter accumulate on the surface of the soil, may also be undesirable because the nutrient cycles develop slower. Too much organic matter would have a detrimental effect.

Fertilization invariably increases the nitrogen content of foliage and the amount of litterfall. These increases of nitrogen probably increase rates of organic matter decomposition and amounts of available nitrogen and other nutrients. Some of these elements originate in the atmosphere and enter the system in rainfall but, unless the precipitation can be absorbed and filtered by the forest floor, these nutrients would be lost to and would pollute streams. Runoff from road construction, site preparation, yarding, and site conversion are all good examples of how some of the total nutrient reserve of the site can be removed (Miller et al. 1976).

Nutrients needed for tree growth and stored near the soil surface are readily leached out of the soil and contaminate streams. Other nutrients, besides nitrogen, that could be affected include cations of potassium and magnesium and anions of phosphorus and sulphur.

Water is the principal carrier of nutrients in the nutrient cycle (Figure 4-1). Although surface runoff would not be excessively high, the large woody debris removed during logging would no longer act as water and silt retention barriers or as a source of nutrients. Suspended sediment and dissolved nutrients would be exported in stream flow and no longer available for site productivity. The amount of nutrient loss by the proposal is generally unquantifiable because of the wide variation of soil, geology, vegetation, and climatic characteristics of each forest ecosystem.

The proposal would result in some soil loss. Subsequent loss of nutrients, soil moisture storage capacity, and reduced infiltration would cause some disruption of nutrient cycling and loss of nutrients through water transport (pollution). This is especially important when logging poorer sites where the same amount of soil loss would have proportionately greater impact.

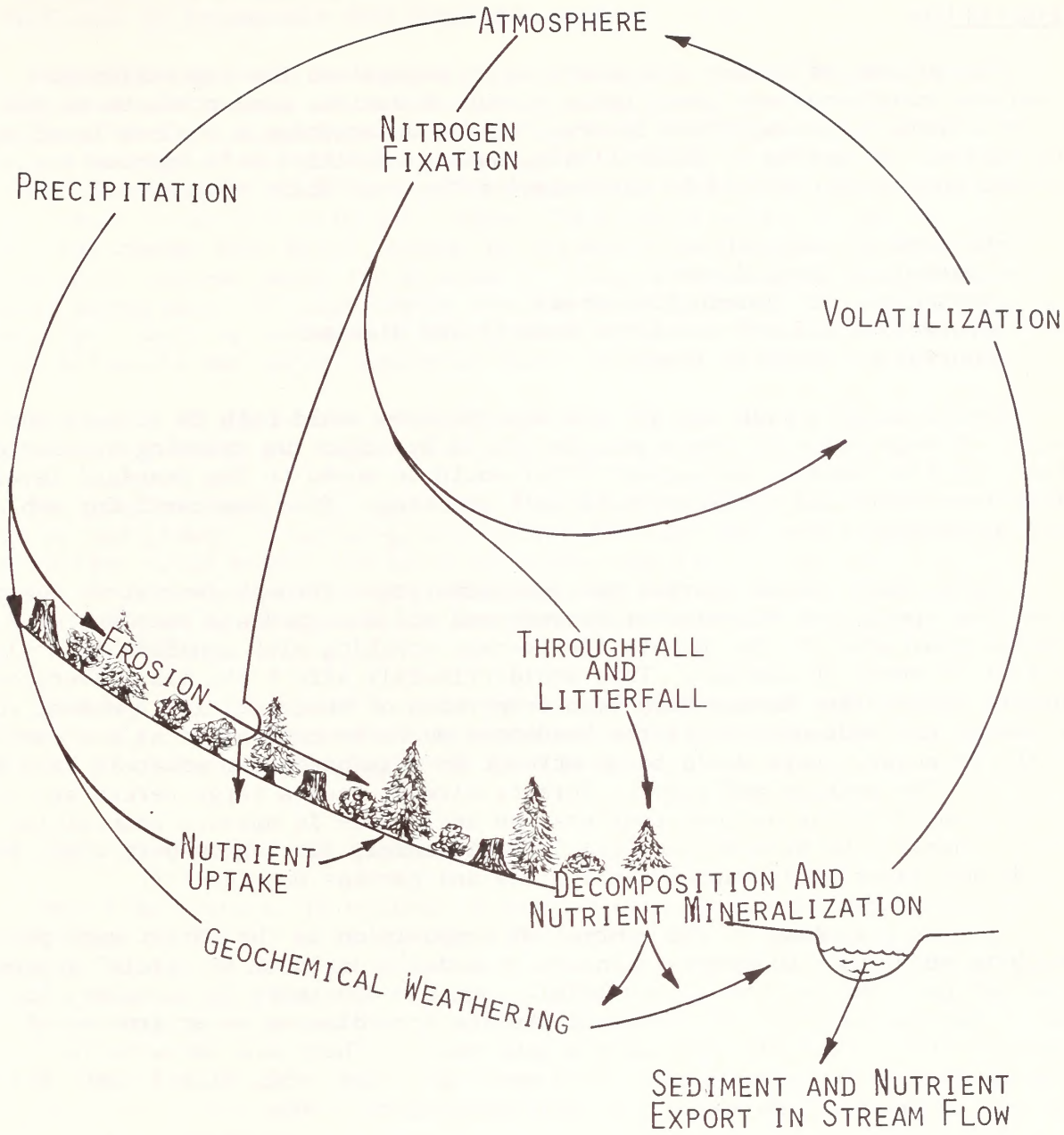

FIGURE 4-1. NUTRIENT CYCLING IN A FOREST. Large woody debris (snags and down logs) critical for nutrient cycling has been gross yarded during timber harvest and is lost as a prime source of nutrients.

VEGETATION

The purpose of timber management is to manipulate the vegetation to provide a continuous and predictable output of various wood products to the market. This is accomplished by creating and maintaining a desired level of regulation. According to Smith (1962), such a condition will improve the natural output of products by manipulating the vegetation through:

-Control of composition.
-Control of stand density.
-Restocking of unproductive areas.
-Protection and salvage (from insects and disease).
-Control of rotation length.

The proposed action and all the alternatives would help to achieve some degree of regulation of the stands in SYU 13 by affecting existing vegetation. Stands in the remedial management level would be moved to the standard level after treatments and achievement of full stocking. (See Chapter 2 for explanation of managment levels).

The proposal would control species composition through removal of unmerchantable species at the time of harvest and all intermediate entries. The desired goal would be to improve the average stocking with conifers from 77 percent to about 90 percent. This would primarily affect the mixed evergreen forests which often have a very high proportion of noncommercial species, such as tanoak and madrone. While the hardwoods would be controlled as a consequence of the proposal, there would be no attempt to eliminate them entirely from the forests. The montane and redwood forests already have a large percentage of their composition in various conifers, so any change in species composition would generally be between conifers. For instance, cutting in pure white fir stands may favor early successional pines and perhaps Douglas-fir.

Another component of the control of composition is the forest gene pool, which is becoming a widespread concern in today's world of artificial regeneration and tree improvement (Silen 1976). Genetic diversity is necessary to ensure enough variation to withstand threats from disease or environmental changes, which would threaten narrow gene pools. There are innumerable examples from agriculture to substantiate this concern (Sauer 1952, Allard 1960, Billings 1964, Flannery 1965, Helbaek 1959, and Mangelsdorf 1950).

Past fires and heavy logging on private land have created a lack of desirable stands of cone-bearing trees in certain localities. The proposed action calls for one 10-acre seed production area, which would help to ensure a seed source for the immediate area. However, without adequate seed production areas on or near other timber sales, there would be no guarantee of genetically appropriate seed according to seed zone and elevation.

Shelterwood harvesting would generally produce sufficient natural regeneration within the immediate vicinity of the sale, although seed could be lacking

for interplanting projects. For areas that are currently nonstocked, it may be difficult to regenerate with desirable genetic stock.

Stand density would be manipulated by both thinning of desirable species on 443 acres and removal of undesirable species on 807 acres. One of the objectives of the proposal is to select the best conifers and accelerate growth. Nonstocked and poorly stocked areas totaling 2,203 acres would be planted (some are included in the 807 acres mentioned under stand density) to bring forest soils back into production. This could entail a 100 percent vegetation change from brush, grass, or hardwoods to conifers. These sites are in their current condition because of fires, past logging practices, and natural succession. Present stands are not growing nearly the potential volume that could be achieved in a regulated forest. It is estimated that the annual allowable cut under regulation would be about 20 million board feet.

The vigor of the stands would be improved by salvage of overmature and often decadent stems and replacement by younger, heartier trees.

The greatest impact on vegetation would be the permanent change of 4,220 acres of old-growth to second-growth during the next 10 years. Also road construction would remove 199 acres of productive forest land, both public and private, from timber production. In steep terrain, it is not likely that roads could ever be revegetated to conifers, and certainly not to their former capabilities.

Off-site disturbance of vegetation as a consequence of the proposal would be relatively minor because most disturbance would be limited to reconstruction and upgrading on existing local road systems.

SENSITIVE, ENDANGERED, AND THREATENED PLANTS

Impact analysis as it applies to sensitive, endangered, and threatened (SET) plants in SYU 13 is limited by information gaps. Several sensitive plants are known to exist on forested tracts, however their extent is unknown. Analysis of potential impacts is further complicated by the lack of knowledge of habitat requirements and how potential disturbances would affect them.

In some situations certain SET plants may benefit from the disturbances of road building and site modification. However, those encountered in old-growth forest stands have evolved in old-growth habitat, so it is assumed that most impacts of timber management activities would be detrimental to SET plants in those areas.

Disturbances can be direct, such as the disturbances of falling and yarding logs; the impacts of road construction, which entails vegetation and soil removal; and the direct killing by herbicides. Indirect disturbances are those such as change in vegetation composition and structure, which modifies

the habitat. Both direct and indirect disturbances as a consequence of timber management could cause extinction of small and unknown plant populations.

WILDLIFE

TERRESTRIAL WILDLIFE

The following headings correspond to the discrete actions outlined under parameters in Chapter 2.

Roads

The proposed action includes 57 miles of new roads and 94 miles of reconstruction during the 10-year period. Approximately 199 acres of timberland would be lost to road construction. Impacts on wildlife from roads are both short and long-term. An unknown number of small, less mobile species, including amphibians, reptiles, and small mammals (shrews, moles, mice), would be killed during construction. The overall impact on these species is anticipated to be low, because many of the animals involved are common and have high reproductive rates. Although animals such as deer, quail and a variety of graminivorous birds would feed along seeded road cuts and fills, compacted roadbeds would be lost as suitable wildlife habitat.

Short-term disturbance of wildlife species would also occur during construction when the larger and warier animals would be frightened from the area. Most wildlife species would return to the area after construction disturbance subsided. The greatest disturbance would occur during the major reproductive period from February through July. However, the young spotted owls remain dependent on parent birds and the nest site area into September (Escano, 1978). Impacts would be most detrimental in the territories of intolerant species, such as the pine marten, goshawk, peregrine falcon, and spotted owl. Permanent public access would be constructed in areas where limited or no access previously occurred. This would result in increased public use of these areas for various purposes. The combined effects of short-term construction disturbance and long-term human harassment, including noise from increased access, could result in the local loss of these species. Other species, including deer, bear, larger predators, raptors, and the pileated woodpecker, would also be adversely affected by increased human disturbance.

Timber Base

Wildlife species respond primarily to the structure of a plant community (Maser and Thomas 1978 and Balda 1975). Although plant species vary, typical structural components of old-growth forests include large overstory trees; uneven-aged, multi-layered, relatively closed canopies; and a high percentage of standing (snags) and down material (logs) in various stages of decay (Bull 1978). These characteristics are complex and require more than an estimated 200 years to become highly developed.

All stands in the timber production base have the potential to develop old-growth characteristics. These lands are included in the base because of their productivity and capability of producing a forest stand. The forest stands proposed for remedial management, however, would take much longer to develop desirable old-growth characteristics than those stands proposed for standard management.

Various forest wildlife species use and become dependent on the structural components of old-growth to fulfill their life requirements. Available habitats extend from beneath the forest floor to the highest tree canopy. Examples of use of these various strata by wildlife is well described (Franklin et al. 1979 and Figure 3-3).

Permanent elimination of old-growth and potential old-growth forests (4,220 acres first 10 years and 48,682 acres long-term) on the land in the timber production base would result in the greatest impacts on terrestrial wildlife. Species dependent on old-growth and mature forests and species that require components produced in these forests would be most adversely impacted.

Silvicultural Systems

Suitable habitat, especially for species that require relatively large areas of old-growth habitat, such as the goshawk, spotted owl, pine marten, and fisher, would be eliminated from the timber production base. For example, available data indicate that the spotted owl requires 300 to 600 acres of old-growth habitat to sustain itself in forest situations (Marcot 1978 and Zarn 1974). Barrows and Balderston (1977) found that these owls are intolerant to heat and depend on a dominant canopy of conifers with a secondary layer of hardwoods adjacent to permanent water to aid thermal regulation during periods of heat stress. These conditions are often found on north-facing slopes in steep drainage basins. Physiological stress related to thermoregulation plays a role in limiting spotted owls to heavily forested areas in northwestern California. Also, the opening up of the forest produces habitat more suitable to the great horned owl and invites predation by this bird on the spotted owl (Marcot 1978).

Overstory trees along with snags and broad-leaved trees would be removed using two-stage shelterwood cuts. These cuts along with various thinnings would result primarily in even-aged, single-species coniferous stands with little structural diversity or the desirable habitat components shown in Figure 3-3.

Snags and large trees are used by a variety of birds and animals for perching, roosting, feeding, and nesting (Franklin et al. 1979, Bull 1978, and Wight 1974). Wiens (1978) and particularly Mannan et al. (1979) indicate that snags constitute an important limiting resource for hole-nesting and aerial-feeding birds (e.g., owls, woodpeckers, swallows, nuthatches, etc.). The primary cavity users (approximately 11 species) are especially important since their abandoned holes are used by the secondary cavity nesters (approximately 21 species). In addition, natural cavities in both conifers and broad-leaved trees provide nesting and denning habitat for approximately 36 species, including the marten, fisher, squirrels, and a variety of owls and bats.

Removal of broad-leaved trees would further simplify the forest thereby reducing habitat opportunities for wildlife. A minimum of 30 species in SYU 13 eat mast and buds of deciduous plants. Approximately 16 species nest in the canopy of hardwood and deciduous trees, and about 15 species use cavities in these trees. Many of the same species also use conifers. Throughout the Douglas-fir region of northwestern California the most important plants that produce animal food include Douglas-fir, tanoak, and madrone (Hagar 1960). This is due to their abundance and wide distribution. Crops (seeds and fruits) of these major tree species differ considerably on a yearly basis. However, when crops are low on one or two of these species, wildlife can use the other(s). Hagar (1960) found that when any of the three chief food-producing trees had a heavy crop, the food was used by wildlife. The other oaks, and particularly the black oak, are especially important to wildlife for feeding and nesting (USFS 1979a and 1973).

The pileated woodpecker is an important widespread indicator of old-growth habitat conditions in SYU 13, but it can be maintained to varying degrees in managed forests. It is the largest woodpecker in the northwest and its large abandoned cavities are used by a variety of secondary cavity users (Bull 1978). Particularly in the fall, the birds feed on fruits and nuts of various trees and shrubs, including dogwood, cherry, elderberry, bayberry, and oaks (Bent 1939 and Martin et al. 1961). Other primary cavity users, such as the acorn, Lewis, hairy, and downy woodpeckers, also feed on available mast and fruit. Deer, gray squirrels, many song birds, and most of the other animals that occur in these forested areas use the seeds, nuts, fruits, buds, and foliage of hardwoods and shrubs to varying degrees. Also important are lichens and fungi that occur in mature forests.

Removal of snags and culls of conifers and broadleaved trees would eliminate necessary habitat components for a great variety of wildlife.

The following examples give some indication of the numbers of birds that could be impacted as a consequence of the proposed action. Breeding bird densities (pair per 100 acres) are available from two studies conducted in the region (USFS 1979a and Thomas 1979). Other birds were also present. Two samplings of 25-acre plots in a Douglas-fir forest near Salyer, California (Hagar 1960) found the following densities: pygmy owl (0) (1), hairy woodpecker (1) (4), sapsucker (5) (4), pileated woodpecker (3) (3), hermit warbler (48) (32), brown creeper (0) (4), red-breasted nuthatch (12) (10), chestnut-backed chickadee (8) (12) and hermit thrush (8) (4). Densities recorded by Grantham et al. (1978) on 19.5 acres of mixed evergreen forest near Branscomb, California were: chestnut-backed chickadee (15), Stellar's jay (15), brown creeper (10), hermit warbler (10), hairy woodpecker (5), red-breasted nuthatch (5), and one goshawk was observed. Hagar (1960) observed that flickers and hairy woodpeckers appeared to increase in numbers in small clearcut blocks (10-20 acres) where logging slash and isolated trees, many of them dead or dying, remained. Additional information on wildlife species densities and territory size requirements from various areas is available (USFS 1979a and Thomas 1979).

Forests bordering on meadow openings are important to many species of wildlife. Of particular importance are forest stands bordering wet meadows, regardless of size (CDFG 1978a). Wet meadow habitat, however, is extremely rare on the timber base lands. Many species, including bats, bear, deer, swallows, and flycatchers, breed and seek cover in the forest and feed in meadow openings. Removal of trees that border meadows and seep areas would further degrade forest habitat.

Timber Management Operations Subsequent to Overstory Removal

After removal of the mature and old-growth forest, most of the subsequent timber management activities would have little impact on species highly dependent on these stages. For timber management practices after old-growth removal, the following discussion will exemplify species that would be impacted but could be maintained to varying degrees in managed timber stands.

Yarding Systems

As with road construction, yarding would result in the death of an unknown number of smaller, less mobile animals and the short-term disturbance of larger, warier species. Tractor yarding would be done on 1,613 acres during the 10-year period and would result in greater and more intensive surface disturbance than cable yarding. Impacts would include compaction of the forest floor (to depths of 8 to 12 inches) and would result in destruction of animal burrows

and loss of plant cover and food. This would result from the movement of tractors and the skidding of logs over the forest floor.

Cable yarding would result in the same types of impacts, but surface disturbance would be less intense.

Both yarding systems would involve a high degree of short-term disturbance while in progress. The greatest impacts would occur during the reproductive season and would be most harmful to the intolerant species. The larger, more mobile animals and birds would be frightened from the vicinity during yarding operations.

Overall, impacts associated with yarding are of high magnitude but short duration with regard to the life of the project.

Slash Disposal and Site Preparation

Gross yarding would remove another important wildlife habitat component, the down log resource. Additional surface disturbance similar to yarding would result from proposed mechanical scarification, and shrubs would be removed.

Logs provide essential habitat for a great variety of invertebrates and vertebrates and are used for lookouts, feeding, reproduction, protective cover, food sources, food storage, and bedding sites (Franklin et al. 1979 and Thomas 1979). At least 28 vertebrates nest among dead and down ground litter throughtout SYU 13 (USFS 1979a).

A great variety of birds use logs as feeding sites, including the pileated woodpecker. Although this large woodpecker reproduces high up in large hard snags, its feeding habitat is the surface stratum of logs and stumps and the base of snags (Franklin et al. 1979). The selected material must be over 7 inches in diameter and the larger the better (Bull and Meslow 1977). Down logs are also important to other old-growth-dependent species, including the northern flying squirrel, red tree mouse, and red-backed mouse.

The flying squirrel uses logs for cover and as storage sites for winter food. Although the red tree mouse is highly arboreal and nests in the tree canopy, males make use of ground litter (USFS 1979a). The red-backed tree mouse is the dominant vole in the old-growth Douglas-fir forest (Franklin et al. 1979). This rodent uses the subterranean forest floor strata and surface log debris. While these animals prefer virgin coniferous forest, small numbers can be maintained in cutover areas by leaving down logs (Tevis 1956). All three species are used as prey by the spotted owl (Whisler and Horn 1977 and Barrows and Balderston 1977).

The more abundant dusky-footed woodrat and the bushy-tailed woodrat use down logs and debris and are also used as prey by the spotted owl and a variety of other predators, including the bobcat.

A much more common animal, the deer mouse, which is an "integral part of the forest food web" serves as prey base for a wide variety of animals, including raptors, snakes, and the larger predatory animals (USFS 1979a). Down logs and other forest debris provide nest sites and cover for the deer mouse, Townsend chipmunk, and other small mammal prey species (USFS 1979a).

Available data reveals that deer mice and dusky-footed woodrats are temporarily more abundant in clearcut areas than in virgin forest (Tevis 1956). However, it is important to maintain these major prey species in all stages of forest succession, particularly near spotted owl territories.

Other site preparations would include brush removal to accelerate forest succession. Impacts would be similar to hardwood removal but of less magnitude to old-growth wildlife species.

Regeneration

Impacts associated with regeneration efforts involve local disturbance of the larger, warier mammals and birds during tree planting. Overall impacts associated with human disturbance would be low since planting would occur prior to the reproductive period and for a short period of time.

Results of regeneration efforts would have long-term impacts on the structure, species composition, and habitat diversity of the stand and ultimately on the wildlife species that could find suitable habitat.

Regeneration efforts seek to shorten early stages of succession and produce a rapidly growing, well stocked, even-aged stand (maximizing timber crop production). The stand would be harvested prior to the development of old-growth characteristics. Ecologically, the result would be a truncated successional pattern in which both early and late stages have been shortened or eliminated (Edgerton and Thomas 1978) and would result in fast growing, even-aged stands with little attractiveness for wildlife (Leopold 1978). The effects of streamlining the early stages are not of great concern at this time, however the elimination of mature and old-growth timber stands from the productive timber base is a more serious problem. These stands would not be suitable for old-growth species, and their use by numerous other species would be impaired. Habitat and subsequent wildlife species diversity increases as forest succession advances toward maturity (Edgerton and Thomas 1978).

Sanitation and Salvage Operations

Sanitation and salvage operations would result in impacts similar to the gross yarding impacts associated with slash disposal and site preparation on an unpredictable basis.

Fertilization

Fertilization on 75 acres would not be expected to result in appreciable impacts to wildlife.

Herbicides

Overall, it is anticipated that impacts from hand-applied herbicide treatments would be low for old-growth species. Minor short-term disturbance of other wildlife would occur during application. Habitat for species associated with early stages of succession, including deer, small mammals, and graminivorous birds, would be altered in an attempt to hasten conifer regeneration. Other open vegetation types occur in the area. Application would exclude the major portion of the reproductive period at these higher elevation sites.

Animal Damage Control

Plastic tubing (such as Vexars) would be installed on seedlings in areas subject to deer browing. No significant impacts are foreseen.

Insect Control

Insect infestations have not been a major problem in the past. Silvicultural objectives to promote even-aged, single species stands could result in increased insect outbreaks. Removal of infected trees would have similar impacts to overstory removal and salvage operations. Food sources for insectivors and potential denning and nesting habitat would be removed. Magnitude of impacts would depend on location, size, timing, and frequency of insect control operations.

As stated in the proposal, insect control operations would be limited to epidemic outbreaks in cooperation with the U.S. Forest Service. Further impact analysis would be required if insecticides were used.

Buffer Zones

Relatively undisturbed buffer zones of 125 and 75 feet would be maintained on both sides of permanent and intermittent streams, respectively, amounting to approximately 308 acres during the 10-year period. Cable yarding would occur through some of these zones and would result in an unknown amount of disturbance and damage to their integrity. These buffer zones in themselves would not provide adequate habitat for the old-growth species that require large territories. Such species include the goshawk, spottted owl, and pileated woodpecker. The buffer zones would also be inadequate for the pine marten and fisher if present.

Animals, such as deer and bear, might find adequate thermal and escape cover. Quality of this habitat would depend upon density of the stand, proximity to public access, and amount of human disturbance. With these proposed buffer zones, it is anticipated that water-oriented animals, including the ringtail, mink, and river otter, would experience only slight reductions in habitat quality. On-site and off-site impacts could be greater in the case of a major road crossing or slope failures resulting from high intensity rainstorms. Resulting heavy stream siltation could degrade the habitat of aquatic food items for these species. These animals are not known to be common on the SYU 13 timberlands.

The preferred habitat of most of the amphibians would be included in the buffer zone. Amphibians such as the Pacific giant salamander and ensatina would sustain some impacts in moist areas outside the buffer zone. As with the water-oriented animals, overall impacts on amphibians would be slight if water quality can be maintained.

Because snags, culls, hardwoods, and dead and down debris would be removed from the adjacent timberlands, the small buffer zones would in many cases provide the only habitat suitable for species that depend on these habitat components. Such species include the primary, secondary and natural cavity users, species that use down material, and species oriented to riparian zones. Due to such requirements as territory size and food availability, these small zones would provide habitat for low numbers of these species. Some of these species would use adjacent timber harvest areas, primarily for feeding. However, species more adapted to lower stages of forest succession and forest edges would increase. This demonstrates the need for providing sizable forest reserves and habitat requirements in areas of intensive timber management. In *Ecological Characteristics of Old-growth Forests in the Douglas-fir Region* (Franklin et al. 1979), it is stressed that 200-foot buffer zones are not viable old-growth units in most cases. This is particularly true for SYU 13, an area where old-growth is limited.

Normally, aquatic invertebrates would not sustain appreciable impacts. Erman et al. (1977) found that streams with buffers greater than 100 feet had invertebrate communities indistinguishable from those of unlogged streams in northern California. However, the authors found that failed road crossings significantly change benthic invertebrate fauna within the disturbance zone.

Proposed 10-Year Timber Sale Plan

Because the proposed 10-year timber sale plan is a representative model of what would occur over the entire timber base area, the following discussion and comments are presented to illustrate situations expected over the life of the project. Inventory data is available for areas within or near some of the proposed timber sales and is summarized in Appendix 4-1. Site-specific data are also available for other timber stands not included in the proposed 10-year model but which were used for overall analysis.

In general, the larger, well-forested blocks near water comprise the most desirable wildlife habitat. This is also the area most productive for timber. Although timber harvest using shelterwood systems would remove various amounts (50 to 70 percent first entry) of the forest canopy in two stages, after final cut (approximately 10 years, which includes up to 5 years for new tree establishment), the area would resemble a clearcut at the seedling/sapling stage of succession. These cut areas would be relatively large (40 to 337 acres with most over 100 acres) and would possess little vertical diversity (varying canopy heights) and other desirable habitat characteristics (Edgerton and Thomas 1978). Because of the relatively large size of these sales from a terrestrial wildlife standpoint, horizontal diversity (the arrangement of various stages of forest succession in a local area) would also be impaired. The proposed large timber harvest areas in SYU 13 would be especially objectionable because BLM timber blocks are relatively small and would result in a large percentage of the individual blocks being in one stage of succession, as opposed to a variety of successional stages (Miller 1978).

Timber sales that remove all or most of the remaining mature or old-growth forest wildlife refuges from an area are especially detrimental. These enclaves provide sources from which animals can repopulate surrounding areas, should suitable habitat develop. They also supply habitat for migrating and wintering birds and species that require both forest and more open areas in close proximity.

AREAS OF SPECIAL BIOLOGICAL IMPORTANCE (CDFG)

The California Department of Fish and Game has established areas of special biological importance within the SYU 13 area. One such area affected by the proposed 10-year timber management plan is a band-tailed pigeon winter concentration area surrounding Covelo, California. Four proposed sales occur on the perimeter of the area, including Poonkinny and Dingman ridges. Only minor impacts are anticipated from the removal of hardwood food trees from these sales. The valley oaks in Round Valley would not be impacted. The BLM administers a very small amount of productive timber base lands in the concentration area (Map 2-2, inside back cover).

FISHERIES

Impacts on the aquatic environment would include both on-site and off-site stream habitat. The proposal would subject approximately 4,220 acres of forest land to various timber management activities. Six stream bridges and numerous culverts would be involved in the construction and reconstruction of approximately 150 miles of road. Less than one mile of fisheries habitat is adjacent to timber sales included in the model 10-year timber management plan.

On-site fishery habitat contains rainbow trout and steelhead. Off-site fishery resources can also be affected by timber harvest activities and could

include King and silver salmon, as well as rainbow trout and steelhead. The summer steelhead in the Middle Fork Eel drainage is considered a sensitive species and could be affected by future timber sales in that drainage.

Several other fish species, both game and nongame, are found off-site in the lower stretches of the larger drainages. However, these species are believed to be less sensitive to the effects of logging than the trout and salmon. No rare or endangered fish species are known to exist in SYU 13. Major rivers and streams are shown on Map 3-3.

The impacts of timber sales for the proposal and alternatives are related to soil erosion and subsequent sedimentation of streams. Some members of the public and most fishery biologists believe that sedimentation associated with logging is detrimental to fish. However, there are a number of studies that raise a lot of doubt as to the validity of that belief. Two ways that sedimentation harms fish life are: (1) by smothering fish eggs, larval fish and fish food organisms, which are produced in stream bottom gravels (Cordone and Kelly 1961), and (2) by filling in the living spaces around the rocks and gravel, making young fish more vulnerable to predation (McCrimmon 1954).

On the other hand, Roby et al. (1977) observed that sedimentation caused a decrease in diversity of aquatic invertebrates but resulted in an overall increase in numbers. He made no observation on the effect of this change on fish. Brode et al. (1973) found a similar response in aquatic invertebrates with a corresponding accommodation to the diet by silver salmon and steelhead. Burns (1971) concluded that salmonid biomass was highly variable and that it would be difficult to attribute a change in carrying capacity of less than 50 percent to anything but natural variation. Although Brode et al. (1973) observed a change in invertebrates, he determined that 100-foot buffer strips reduced this impact to insignificant levels.

In the studies, it is probable that other variables, such as increased nutrients or water flow, were being positively affected by logging to the extent that they hid the negative impacts of sedimentation. At this time, it seems that there have not been enough studies to isolate the biological impacts that affected some parts of the biological community negatively and other parts positively. The final impact on fish is quite obscure and may result in a paradoxical conclusion depending on the species, life stages, or parameters being studied. Apparently more studies are needed to provide definitive answers on this subject. At this time, it is probably safe to say that a slight increase in sedimentation associated with good logging practices would not be significantly detrimental to fishery resources in this North Coast area.

Other impacts on fish are associated with logging slash or waste products in streams causing a reduction in oxygen content, or chemical pollution of the water and loss of streamside vegetation causing an increase in water temperature

area that could be lethal to fish. The problem of chemical pollution is fairly well under control through an increasingly better understanding and appreciation of good water quality, as well as compliance with more stringent water-quality control laws. The problems of slash in streams and thermal pollution are generally solved by leaving buffer strips of undisturbed vegetation on each side of a stream.

As shown on Maps 2-2 and 3-3, the fisheries habitat that would be impacted by timber management activities is relatively small. The buffer strips, road and sale design, and erosion control measures included in the proposed action are reasonable for fisheries. These measures should prevent significant impacts to fisheries habitat, regardless of the alternative chosen. Some difference in impacts between the various alternatives could occur based on the difference in anticipated erosion rates. In any case, the amount of impact on fisheries is not expected to be measurable.

Recreation

The impacts associated with logging have a severe negative effect on the recreation experiences that depend on a natural or natural-appearing environment. However, the relationship between environmental qualities and recreation experiences are variable and complex. A wild river boating experience may be diminished by any evidence of logging, but some activities may be unaffected or even enhanced by timber harvest. For example, deer hunting may be improved by better access, longer shooting distances, and an increased deer population that could result from timber harvest.

Within SYU 13, only a few of the forested tracts have superior potential for providing recreation opportunities. These lands have been identified in management framework plans and in some cases have been allocated to recreation use with the exclusion of timber harvest.

For the purpose of analyzing impacts, the remaining lands can be generally classified as (1) large tracts ($>$1000 acres), (2) small tracts ($<$1000 acres) with special recreation values, and (3) other small tracts.

The large tracts have moderate recreation value. Some have added importance because they are adjacent to or near branches of the Eel River. One large area, Cow Mountain, is significant because of its proximity to the Ukiah Valley, the highest population area in Mendocino County. Timber harvest on these blocks would decrease aesthetic quality and reduce their value for wildlife observation, natural history study and appreciation, and other uses that depend on the beauty and solitude of unmanaged, unmodified ecosystems. Portions of seven blocks, each over 1,000 acres in size, would be disturbed during the next 10 years.

The small tracts with special recreation values are primarily those adjacent to rivers in the California Wild and Scenic Rivers System. A few have long-term potential because of access or proximity to population centers. Timber harvest on the wild river tracts would potentially have serious negative impacts on the wild and scenic qualities of the riverway. Two small tracts with recreation value would be adversely impacted by the proposed action.

The small tracts without special recreation values are generally remote and have steep terrain. Their principal recreation value is the diversity they provide in the landscape. Frequently, they are unlogged islands within an otherwise logged-over region. Timber harvest would eliminate this value.

The access roads developed for the timber program would necessarily cross many private land holdings. Rights for public use are generally obtained for rights-of-way to the larger tracts. Public use of these roads and of the public lands they lead to creates trespass, fire danger, litter, and vandalism problems for the private lands. The magnitude of the potential problem is very specific to each area. It depends on factors such as length of road crossing private land, size of public land, and distance from population area. These are difficult problems to solve, and can only be partially eased by more intensive management.

Natural Areas

OLD-GROWTH DOUGLAS-FIR

Timber management activities on the 48,682 acres of public lands in SYU 13 identified for intensive forest management would seriously reduce the opportunities for preservation of a system of widely distributed old-growth Douglas-fir. Preservation of the old-growth Douglas-fir ecosystem would ideally include large integrated natural systems, such as entire watersheds. In addition to Douglas-fir, a large area could contain a diversity of other habitat types. There are few opportunities remaining in SYU 13 for establishment of large, fully integrated areas.

A complete natural area program would also include numerous smaller, widely distributed areas with diverse topographic and ecological situations. Public lands within SYU 13 offer numerous opportunities for providing this element of a natural areas system.

The proposal would initiate timber harvest activities on 4,220 acres, most of which contain virgin old-growth Douglas-fir. The Butte Creek, Big Butte, and Elkhorn Ridge areas have potential for old-growth preserve systems that would be impacted by the proposal. The proposal would also impact many

areas that could serve as components of a preserve system; however, there have not been any inventories to adequately determine the extent of the old-growth communities. It is therefore difficult to assess the magnitude of the impact on the opportunity for creation of a preserve system. The best information available has been gathered by the wildlife management program. (See wildlife section for a more detailed analysis of the opportunities for an old-growth preserve system.) The proposal's inclusion of 125-foot buffers along perennial streams and 75-foot buffers along intermittent streams would provide narrow undisturbed strips. Current plans for 1/4-mile buffers along wild and scenic rivers will also preserve a few narrow corridors.

COASTAL REDWOODS

A few parcels of public land contain remnants of the coastal redwood community (Map 3-4). The few stands with significant acreage or trees of impressive size have been analyzed in the management framework plans, and several have been recommended for protection.

CULTURAL AND SOCIOCULTURAL RESOURCES

CULTURAL RESOURCES

Presently the Bureau lacks the quality and quantity of data necessary to complete an in-depth impact evaluation of each timber management activity on cultural resources. Such data can be generated only by long-term monitoring programs designed specifically to address impacts related to timber management. Several studies have been initiated but at the moment they offer little information for this analysis. It is assumed that each activity of the proposed timber management program could directly impact cultural resources.

Cultural resources are impacted when they are altered in any way from their original condition. The distribution, relationships, and patterns of materials of interest to scientists are extremely fragile and studied in great detail. "If one site in a past . . . system is altered as a result of direct impacts, then the total past system has been altered" (Reid 1978, page 18).

Timber management is a complex program and includes numerous activities that result in surface disturbance. A single activity may only impact a small portion of the ground surface but, collectively, the activities associated with a sustained-yield timber management program could cause surface disturbance of a very large area.

Generally, impacts on cultural resources may be either direct or indirect and will occur as a result of any surface disturbing action.

Direct Impacts

Direct impacts on cultural resources as a result of timber management generally fall into three categories (USDI, BLM, 1978):

1. Compaction of soil or sediment.

2. Physical disturbance of the ground surface.

3. Alteration of chemical properties of minerals in the soil by fire, chemical treatment, or addition of organic matter.

All three can result in breakage and destruction of surface artifacts and displacement of surface patterns and subsurface deposits.

Road construction, yarding, slash disposal, and regeneration activities would result in the greatest amount of soil compaction and surface and subsurface disturbance.

Road Construction and Maintenance

Construction and maintenance of both mainline and spur roads generally involve blading, resurfacing, and excavation for bridge and culvert implacement. Such activities could severely disturb or destroy prehistoric and historic sites.

Yarding Systems

Surface disturbance would be most intense along yarding alleys created by the weight of logs or slash dropped and dragged repeatedly along the same routes. Activities of this nature over prehistoric and historic sites would cause both vertical and horizontal displacement of cultural material. Both ground and cable yarding systems result in varying degrees of surface disturbance and soil compaction. Ground systems are known to cause greater surface disturbance than cable systems.

Both ground and cable yarding systems and the construction of landings pose a significant threat to cultural resource preservation. In northwestern California, cultural resource sites tend to be situated on relatively flat areas along ridgetops or midslope terraces. Consequently, there appears to be some correlation between areas of prehistoric and historic use and areas suitable for road and landing construction. Surface disturbance would be particularly severe at these locations.

Reforestation and/or Site Preparation

Cultural resources could be impacted in areas where seedlings are planted by hand tools such as hoes, mattocks, and dibbles, or power augers. Site preparation for reforestation involves the cutting of hardwoods and other competing species. Generally, ground yarding systems are used to collect materials for piling and burning, and cultural resources could be directly impacted by such activities.

Herbicides

It is not presently known what impacts herbicides could have on the composition of and scientific data contained in the cultural resources buried in the soil.

Indirect Impacts

Although any activity could initially cause relatively minor surface disturbance, the long-term indirect impacts could be quite devastating. Indirect impacts would generally result from soil erosion and increased visitor use.

Timber management activities could accelerate erosion by significantly depleting the top soil and causing loss of vegetation. Erosion could contribute greatly to the spatial displacement of stone artifacts and other cultural items. Both surface and subsurface cultural materials could be impacted by erosion. Severe disturbance or alteration of vegetation near a cultural resource site would disturb the visual setting and weaken its human interest values.

Timber management units previously protected by remoteness would have permanent public access. Increased visitor use could promote the unauthorized collection of cultural materials by pothunters for personal gain. It would also provide new areas for off-road vehicle (ORV) use. Cultural resources that are at or near the surface are particularly vulnerable to direct damage by ORVs.

Off-Site Impacts

The Bureau's timber management program could have off-site impacts. The development of public access roads into areas that were previously remote could make timber harvesting more cost effective for the adjacent private landowner. The harvesting of timber on public land could promote the cutting of timber on private lands, thereby increasing the likelihood of impacts occurring on non-Federal cultural resources.

On-Site Impacts

To determine the site-specific impacts associated with timber management activities on cultural resources situated within SYU 13 and included in the 10-year plan, an intensive prehistoric and historic sites inventory was conducted on 26 tracts. Eleven sites were recorded, including 10 prehistoric and one historic site.

All 11 sites would be impacted by timber management in the 10-year period if they were not avoided and protected. Fifteen tracts were inventoried with negative results. Timber management activities conducted within the boundaries of these specific tracts would have no impacts on cultural resources.

Although some areas were inventoried with negative results, there remains a possibility that subsurface materials could be encountered in the course of timber management activities.

SOCIOCULTURAL RESOURCES

An inventory of sites significant to Native Americans was conducted to determine the potential impacts of timber management activities upon sociocultural sites situated on lands included in the SYU 13 timber base (48,682 acres) (Map 2-2, inside back cover).

Generally, all surface-disturbing actions, including road construction and any activities related to timber harvest, could have direct impacts upon tribal cemeteries, sacred shrines, and spiritual and ceremonial sites. Traditional hunting and plant collecting areas could also be directly impacted by timber management activities.

Sociocultural sites would be indirectly impacted by increased recreational use (ORVs, hunters, etc.). Recreationalists may inadvertently intrude upon Native Americans during sacred ceremonies or other cultural activities.

The Native American sites inventory identified two significant sociocultural sites - Cahto Peak and the Pecwan tract.

The Cahto Peak area has long been a traditional hunting and gathering area for local Native Americans. It is presently impossible to determine the nature and extent of impacts since specific timber management plans have not been defined for public land in the Cahto Peak area.

Members of the Yurok tribe are concerned about potential impacts on fisheries on the Klamath River. Specifically, they fear that Pecwan Creek, Achelth Creek, and their tributaries may become silted if timber harvests occur on the Pecwan tracts. They are also concerned about potential impacts that might occur on sacred trails located near the Pecwan tract. The trails have long been used by Native Americans to obtain access to special use areas.

The off-site impacts on prehistoric and historic sites would also apply to sociocultural sites.

Many Native Americans believe that the disturbance of buried cultural materials, whether it be by timber management activities or by professional archaeologists, is an infraction upon their cultural heritage. Timber management activities may promote increased visitor use which may result in increased vandalism to sociocultural sites. The Native American community of northwestern California is particularly concerned about increased vandalism on sociocultural sites by individuals for personal gain. They are specifically concerned about the vandalism of burial sites containing the remains of known relatives.

Visual Resources

Most timber harvest practices result in moderate to severe visual changes in the visual landscape. Vegetation patterns are greatly disrupted, soil is exposed, and new roads are constructed. New and contrasting lines, colors, forms, and textures are added to the scene. The magnitude and significance of these changes are highly dependent on specific site characteristics, including existing patterns, visual distances, aspects, number of potential viewers, quality of the scenery, and many others. As noted in Chapter 3, the lands in SYU 13 have been systematically evaluated for these visual elements and have been placed in management zones defined by the degree of restriction placed on visual contrasts created by management activities.

Within SYU 13 the approximate acreage of inventoried public lands in each visual resource management (VRM) class is as follows:

VRM Class	Public Land (acre)
I	10,440
II	35,755
III	24,758
IV	140,190
V	740
	211,883

The 10-year timber management plan would have an impact on lands in the management classes as shown below:

VRM Class	Acres
I	0
II	1031
III	219
IV	3800
V	0

Three proposed sales, comprising 618 acres in Class II, are in wild and scenic river corridors. Portions are on slopes only partially visible from the rivers, and some of the harvest areas are over a mile from the river. The remaining Class II areas are visible from major roads and towns. It is feasible to screen the logging areas from view or modify harvest plans to meet Class II objectives.

The other sales all fall within Class IV management zones. It should be feasible for the proposed sales to meet objectives of this class.

In all cases, the VRM contrast rating procedure will be used to analyze proposed visual change, and steps will be taken to meet the VRM class requirements.

Timber harvest in the Class II areas would be the most difficult to accommodate visual objectives. The proposed shelterwood silvicultural system leaves a 30 to 50 percent canopy after the first entry. This eases the severity of visual change as compared to clearcutting. The second overstory removal cut may be equivalent to clearcutting in impacts at close viewing distances.

Road construction is also very difficult to modify to meet Class II and III objectives. In some cases adequate screening with buffer strips would be the only feasible mechanism.

WILDERNESS

During the period of wilderness review and until Congress acts on the President's recommendations, BLM is required to manage public lands determined to have wilderness characteristics so as not to impair their suitability for wilderness. The BLM has developed "Interim Management Policy and Guidelines" to comply with the nonimpairment mandate imposed by Section 603 of FLPMA. Copies of these guidelines are available from any BLM Office.

Management under the nonimpairment standard of the interim management guidelines has two goals: (1) to ensure that an area determined to meet the 1964 Wilderness Act's 2(c) definition of wilderness now still meets the definition when Congress gets ready to act, and (2) to ensure that the area's wilderness values have not been degraded so far, compared with the area's values for other purposes, so as to significantly constrain the recommendation made with respect to the area's suitability for preservation as wilderness.

The three designated Wilderness Study Areas (WSAs) containing lands within the timber production base are Red Mountian, Big Butte, and Thatcher Ridge (Map 3-5). None of the discrete operations of the proposed action or

alternatives would be allowed in the three affected WSAs or any area under protest or appeal as long as each area is under wilderness interim management. Commercial timber harvest, thinning, and stand conversion are not permitted. Pruning, site preparation, reforestation, and salvage logging after natural disaster may be permitted only in cases that satisfy the nonimpairment criteria. These interim management restrictions apply only during the time an area is under wilderness review and until Congress acts on WSAs. After Congress acts, an area will either be designated and managed as wilderness and portions of the area removed from the timber production base, or designated as nonwilderness and returned under general BLM management policies.

Land Uses

LAND-USE PLANS

The proposed action and alternatives would not conflict with local or State planning, and it is not anticipated that they would conflict with the forthcoming revisions of the Humboldt and Mendocino counties general plans.

TRANSPORTATION NETWORK

Existing highways and paved county roads frequently carry log truck traffic from private lands and U.S. Forest Service timber sales. The volume of timber to be removed from public lands under the proposed action and alternatives would not be a significant change from the current level of log traffic on these roads. However, some of the more remote unpaved county roads would be subjected to significant increased log traffic during the operating period of any particular BLM timber sale. This could increase the county's road maintenance responsibilities during that period of use.

Depending on the volume of the individual timber sale and the speed with which the purchaser removes the timber, the use could range from a few truckloads per week to as many as 15 or 20 truckloads per day and last for as short as 4 weeks to as long as 6 months. Logging and subsequent log hauling would normally be confined to drier summer weather since most roads will not hold up under heavy winter use and winter logging causes greater environmental damage.

Under any of the alternatives, the use pattern on any particular road system would be logging traffic for one or two summer seasons followed by several years of no logging traffic.

The proposed action and alternatives would require the acquisition of easements across private land to provide access to the timber sale areas. In most cases the easements would be perpetual. Easements to large blocks of public land with multiple resource values would provide access for the general public.

Access for the public increases road use for hunting, sightseeing, camping, woodgathering, etc., which increases the incidence of trespass, vandalism, man-caused fires, and dumping of trash on the private lands crossed by the easements.

Easements to smaller parcels with only the timber resource to consider would not allow access for the general public. Therefore, the impacts on private lands would be primarily those associated with road construction and log truck traffic.

Because all of the alternatives require a significant increase in perpetual easements, there would be a proportional increase in BLM's road maintenance costs required to keep the roads open for administrative purposes and, where appropriate, public use. The alternatives differ in maintenance costs only in the short run, as all land in the timber production base would eventually have easements.

SOCIOECONOMICS

EMPLOYMENT AND EARNINGS

The proposed action, with an estimated annual allowable cut of 9.7 million board feet (MMBF), would contribute 0.14 of 1 percent of the total employment in the region and 0.70 of 1 percent of the estimated 9,800 lumber and wood products employees. These estimates are computed using 7.1 employees per MMBF and 0.26 trade and other residentiary employees per lumber and wood products employee (Terrascan 1979).

Earnings resulting from this alternative are estimated at 0.21 of 1 percent of the regional earnings.

MILL PRODUCTION

The sale of 9.7 MMBF would provide 64 days of operation to a mill with 151 thousand board feet (MBF) per day production. An example of this level of production is the Sierra-Pacific mill in Samoa, which had a 1977 timber production of 55 MMBF. The sale of 9.7 MMBF could provide 3.3 months of production at the Louisiana-Pacific mill in Covelo, which had a 1978 production of 35.5 MMBF. It is not anticipated, however, that any one mill will receive all BLM timber sold in any one year.

BLM CONTRIBUTION TO HUMBOLDT AND MENDOCINO COUNTY TIMBER PRODUCTION

Historically BLM timber sales have been divided 73 percent to Humboldt County and 27 percent to Mendocino County timber operators. The proposed action reflects this historical perspective, as it is estimated that approximately 72 percent of the total timber would be available in Humboldt County with the remaining 28 percent in Mendocino County. With the high transportation cost, it is assumed that the timber would be processed in the same county as its availability.

Based on these estimates, this alternative would provide an annual average of 7.0 MMBF to Humboldt County operators and 2.7 MMBF to Mendocino County operators. This timber would provide 0.77 percent of Humboldt County's 1977 production of 903.5 MMBF and 0.61 percent of Mendocino County's 1978 production of 440 MMBF.

In perspective, the Six Rivers National Forest is proposing an annual average (1980-1985) of 152.55 MMBF; 43 percent, or 65.6 MMBF, is estimated to be available to Humboldt County. This would be approximately 7.3 percent of Humboldt County's 1977 production.

The Mendocino National Forest is proposing an annual average (1980-1986) of 81.3 MMBF: 41 percent, or 33.3 MMBF, is estimated to be available to Mendocino County. This would be 7.6 percent of Mendocino County's 1978 production.

VALUES AND EXPECTATIONS

Any logging of public lands is opposed by some who feel that public lands should remain in a pristine condition for primitive recreation and wildlife values. Others consider timber harvesting valuable, not only for the timber resource but also for the resultant public access for recreational purposes. The timber industry and those whose jobs depend on a steady flow of timber are in support of timber harvesting but would prefer a higher level than proposed in this alternative.

CONCLUSIONS

Because of the small contribution to regional employment, the gross regional population would not be impacted by this alternative.

The year-to-year changes that result from the variability in total regional timber harvest would exceed the impacts of this proposal.

Impacts on sensitive, endangered, and threatened plants; fisheries, cultural, sociocultural, and wilderness resources; land-use plans; the transportation network; and public values and expectations would be the same as the proposed action for all alternatives.

Soils

The amount of erosion caused by the other alternatives would differ from the proposal because of differences in miles of road construction and reconstruction, acres yarded, and other actions. Erosion caused by the no action and limited investment alternatives would be proportional to the proposal.

Compared to the other alternatives and the proposal, the managed old-growth alternative would cause the least erosion. By leaving mature trees, snags, down logs, and slash in place in yarding areas, the forest floor would be protected from raindrop impact and overland flow. The old-growth alternative would result in about a 15 percent decrease in erosion rates.

A comparison of total tons of erosion caused by road construction, yarding, and other activities can be found in Table 4-6. The lowest overall impacts would be from the limited investment alternative because of less road construction and reconstruction and fewer acres yarded or otherwise disturbed. However, the managed old-growth alternative would have the lowest impacts per acre of harvested area.

Water

The effects of the alternatives on water yield and water quality would vary with number of acres logged, proportion of skyline cable logging to tractor and high-lead logging, miles of road construction and reconstruction, and extent or quality of logging.

Compared to the other alternatives, the managed old-growth alternative would result in the least water-quality problems and would add the least amount of sediment to the cumulative sediment problem that now exists throughout the North Coast streams. Ground cover remaining after implementation of the managed old-growth alternative would help retard surface runoff and sediment yield from reaching streams.

TABLE 4-6

TONS OF EROSION-PROPOSED ACTION COMPARED TO ALTERNATIVES
(10-Year Period)

	Proposed Action	No Action	Limited Investment	Accelerated Harvest #1	Accelerated Harvest #2	Managed Old-Growth
Roads 1/	14,825	13,060	11,290	15,415	21,500	13,650
Yarding & other Activities 2/	51,930	41,270	34,270	65,620	88,570	34,220
Percent Erosion Compared To Proposed Action	----	81%	68%	121%	164%	72%
Total Erosion (Tons)	66,755	54,330	45,560	81,035	110,070	47,870

1/ Includes erosion from road construction, reconstruction and maintenance.

2/ Includes erosion from slash disposal and site preparation, site conversion and grass/animal control.

Comparison of sediment yield for all alternatives is made in Table 4-4. The proposed action would add an estimated 6,140 acre-feet of water to the normal water yield at the expense of introducing 3.9 acre-feet of sediment. The limited investment and managed old-growth alternatives would produce more water with less sediment. The no action and both accelerated harvest alternatives would produce more water but would also produce more sediment.

VEGETATION

NO ACTION

Impacts on vegetation as a consequence of the no action alternative would be about the same as for the proposed action. It is less intensive than the proposed action, as it does not entail the establishment of seed production areas, precommercial thinning, and grass or animal control. Manipulation of species composition and stand density would be more risky and the results less predictable. Old-growth would still be eliminated on the timber production base and never replaced. Roads would eliminate 160 acres of productive forest land in the next 10 years.

Adequate provision for guaranteeing appropriate seeds for reforestation activities is not made under this alternative. Harvest would eventually result in narrowing the gene pool and exotic ecotypes may have to be introduced. Clearcuts would account for most of the cut volume, and clearcuts have been difficult to reforest in the past.

LIMITED INVESTMENT

Impacts on vegetation as a result of the limited investment alternative would be drastic. The old-growth would be permanently removed from the timber production base and never replaced. Because there is no planned manipulation of the vegetation by thinning, hardwood control, etc., the resulting species composition and density would be open to chance.

Because the conifers are being selected for harvest, and only extensive silvicultural practices are applied to eliminate competition (cutting and gross yarding of hardwoods at the time of harvest), hardwoods would be favored in the mixed evergreen forest and brush and grass would be favored in the montane forests. Roads would eliminate 129 acres of productive forest land in the next 10 years. The limited investment alternative reflects the natural stand condition of growth and would have a lower allowable cut than the proposed action.

Adequate provision is not made in this alternative for guaranteeing appropriate seeds for reforestation activities. Harvest would eventually result in narrowing the gene pool. Exotic ecotypes may have to be introduced.

ACCELERATED HARVESTS

The short-term impacts on vegetation due to the accelerated harvest alternatives would be almost identical to the proposed action. However, old-growth stands would be converted to regulated forest in a much shorter period of time and attain the potential harvest level of 20 million board feet per year sooner. The rapid acceleration in harvest also requires an acceleration in rehabilitation, particularly in restocking bare land. If this were not achieved, there would be a lag between the liquidation of existing standing stock and the cutting of second growth.

Acreage removed from the timber production base by road construction in the first 10 years after implementation would be 215 acres for accelerated harvest #1 and 299 acres for accelerated harvest #2.

Adequate provision is not made in these alternatives for guaranteeing appropriate seeds for reforestation activities. Harvest would eventually result in narrowing of the gene pool, and exotic ecotypes may have to be introduced.

MANAGED OLD-GROWTH

The managed old-growth alternative resembles an "irregular shelterwood," as described by Smith (1962, pp. 450-452). Species composition would be affected in the same manner as the proposed action, with conifers favored and attaining a greater proportion in the stands. The early successional stages would be eliminated as in the proposed action. However, the old-growth component would not be completely eliminated. A percentage of the stands would be carried over to a larger size after two rotations. There would be no removal of logs and debris, except that necessary for planting and for controlling an unusually high fire hazard. The debris and large stems resemble old-growth characteristics above and below ground, such as soil nutrient balances, micro-organisms, and burrowing animals. Long-term site productivity and protection are anticipated to be greater with this alternative than with the other alternatives (Franklin et al. 1979).

The standing superdominant trees would offer the added protection of a two-storied stand, such as a permanent seed source. In the event a fire kills the younger stand, the older, more fire-resistant stems may be left alive and provide some seed. This would be a great consideration in species such as sugar pine, which do not bear good cone crops until the age of 130 years.

WILDLIFE

All alternatives have a similar timber base, except no action which has a larger base. Silvicultural practices and harvest methods are the same for all alternatives except the no action, limited investment, and managed old-growth. The accelerated harvest alternatives propose the greatest area of disturbance from more intensive harvest and the inclusion of additional timber sales during the initial 10-year period. Accelerated harvest #1 proposes the shortest rotation cycles of 70 years. All other alternatives have rotations of approximately 90 years. Exceptions occur in managed old-growth where 12 to 13 trees per acre would be carried to an approximate age of 200 years. With the exception of managed old-growth, none of the alternatives contain any consideration of wildlife in the form of snags, down logs, broad-leaved plants, stand structure, policies to account for lack of on-the-ground knowledge and variability in natural environments (Vogel 1976), or other special habitat requirements.

Because of less overall disturbance and a greater availability of old-growth for a longer period, it appears that the limited investment alternative would be desirable for wildlife in the short-term. In the long-term, managed old-growth indicates benefits to wildlife by actively recruiting habitat components in the form of large superdominant leave trees, large snags, and large woody debris. However, it is not clear how this alternative would be implemented to provide immediate benefit to wildlife. Since the objective of the managed old-growth alternative is to recruit and maintain some large trees and large woody debris in managed forests, the following points of clarification are made for the purposes of impact analysis.

1. When the forest stands under 200 years of age are initially cut, a minimum of 12 to 13 of the largest trees available would be maintained on each acre. In stands over 200 years old, six superdominants would be invested in the site. Where large trees are involved it is estimated that the superdominant canopy cover would amount to 15 to 20 percent per acre, depending on spacing of stems.

2. Down logs would not be removed from the site.

3. All snags would be left standing. "A managed old-growth alternative for BLM's Sustained Yield Unit 13 Timber Management Statement" (Goes 1980) contains a more complete description and rationale for a managed old-growth alternative.

The timber production capability classification (TPCC) process is relevant to the assessment of both positive and adverse impacts to wildlife. The most productive forest lands, which are included in the 48,682-acre timber base, were identified by the TPCC process. The TPCC relies heavily on soil productivity and soil capability to produce timber stands of economic and commercial value. Forest stands vary some within this framework (e.g.

northerly versus southerly exposures). However, all stands contain or with time have the potential to produce known wildlife habitat requirements, including the various old-growth components (USFS 1979a, Thomas 1979, and Barbour and Major 1977).

The timber management parameters for the proposed action and alternatives would remove or alter the known habitat requirements. The U.S. Forest Service, using the North Coast Cascades Zone-California Wildlife Habitat Relationships Program, is able to make reasonable predictions about the decrease in wildlife species that would result from the removal of various habitat requirements and components (Solis and Toth 1979). For example, Figure 4-2 illustrates potential decrease in species resulting from the removal of dead and down material and the importance of maintaining such material through all stages of forest succession.

The TPCC process also withdrew approximately 9,100 acres of productive forest lands from the timber base due to various physical problems. These sites, if left unharvested, would provide benefits to wildlife, particularly the larger sites.

Table 4-7, based in part on professional judgment, is a guide to compare anticipated impacts to habitat quality from the proposed action and alternatives. Consideration was given to the amount of habitat alteration (i.e., removal or retention) of important known habitat requirements of selected wildlife species. Evaluation items include snags, down woody debris, broad-leaved trees, stand structure, habitat size requirements, habitat preferences, and knowledge of the area from inventories. Also considered was the amount of surface disturbance and intensity of timber harvest associated with the various alternatives.

All timber management proposals would result in varying degrees of localized human disturbance, both short-term and long-term, including impacts of noise. As pointed out by Whitcomb et al. (1976), human disturbance associated with recreational activities can be especially detrimental to wildlife in small habitat areas. Attempts would be made to reduce these impacts by closing spur roads.

Of the proposals offered, the managed old-growth has the greatest potential to provide benefits to wildlife. It provides managers with some flexibility and options in providing old-growth habitat components by retaining trees a minimum of 200 years. This alternative is particularly strong in providing breeding and feeding habitat components for cavity users (Thomas 1979, life forms 13 and 14) and numerous species that use down woody material (USFS 1979a and Thomas 1979). Suitable habitat would be provided for many of the species that require large conifers (Thomas 1979, life forms 10 and 11).

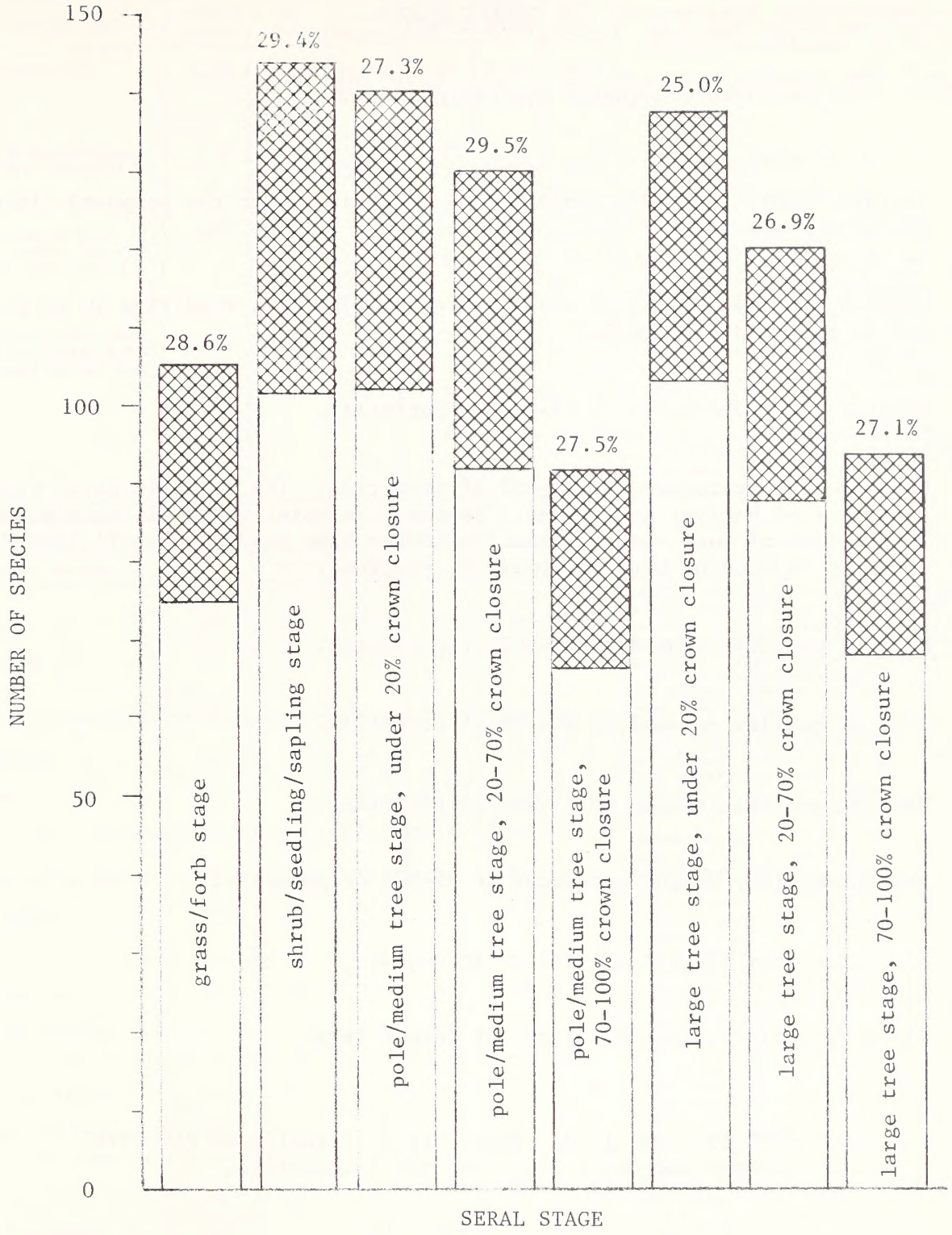

FIGURE 4-2. Percent potential decrease in species caused by removing dead and down material from seral stages in mixed evergreen forests on the Six Rivers National Forest (modified from Solis and Toth 1979).

TABLE 4-7

IMPACT EVALUATION CATEGORIES

1. Suitable habitat would essentially be eliminated from the proposed timber production base.

2. Overall quality of habitat would be severely reduced resulting in up to 15% of expected potential.

3. Habitat quality reduced to 15-30% of potential.

4. Habitat quality reduced to 30-45% of potential. (It is anticipated that reduction of habitat quality much beyond this point would ultimately result in the loss of many species from the timber base lands and would result in severely reduced numbers of remaining species.)

5. Habitat quality reduced to 45-60% of potential.

6. Habitat quality reduced to 60-75% of potential.

7. Habitat quality reduced to 75-80% of potential.

8. Habitat quality slightly reduced to 85-90% of potential.

9. No appreciable adverse impacts anticipated.

10. Slight beneficial impacts up to 15% (short term).

Sources: USFS 1977 and 1979a, Thomas 1979, Franklin et al. 1979, Jackman and Scott 1975, and BLM inventories.

TABLE 4-7

ANALYSIS OF IMPACTS - WILDLIFE

PROPOSED ALTERNATIVES	Proposed Action	No Ø Action	Limited Invest.	Accel. Harvest No. 1*	Accel. Harvest No. 2*	Managed Old-Growth	
Timber Production Base (Acres)	48,682	54,247 (+11%)	48,682 (=)	48,682 (=)	48,682 (=)	48,682 (=)	Ø Little to no or irregular commitment to buffer zones, current state-of-the-art silvicultural practices and multiple-use land management.
Timber to be Removed (MMBF) 10-Year Plan (Allowable Cut)	97	78 (-20%)	65 (-33%)	105 (+8%)	146 (+50%)	85 (-12%)	* Accelerated alternatives include a greater intensity of timber harvest and a greater area of disturbance.
Area Disturbed and Lost (Acres) Yarding, Road Construction, 10-Year Plan	4,419	3,512 (-21%)	2,913 (-34%)	4,789 (+8%)	6,720 (+52%)	3,733 (-16%)	+ Greater than proposed action.
Area Retained in Small Relatively Undisturbed Buffer Zone (Acres) 10-Year Plan	308	235	196	336	472	248	= Equal to proposed action.
							- Less than proposed action.
							# Assumes that buffer zones (125' and 75' each side of permanent and intermittent drainages) will normally result in a high degree of habitat protection for aquatic areas. Additional impacts could occur as a result of major road failures, land slumping, or high intensity storms. Aquatic habitat would then be subject to degradation to varying degrees and distances, both on and off site.
							** Any unforeseen impacts will be completely mitigated according to Sec. 7 of the Endangered Species Act in cooperation with the USFWS and CDFG.
Selected Representative Wildlife Species							
Amphibians# and Reptiles							
Tailed Frog Ascaphus truei	7-8 1-6	1-3	8-9 1-7	7 1-6	6 1-5	8-9 1-7	Habitat confined to permanent streams and streamsides. Does require high quality water which could be slightly impacted with normal practices. Greater problems could arise with unforeseen accidents. This could result in increased silt loads and channel alteration both on and off site for varying distances downstream.
Red-legged Frog Rana aurora	6-7 1-5	1-4	8 1-7	6 1-5	5-6 1-4	8 1-7	Similar to above but prefers quiet water such as ponds. Little suitable habitat known or expected on SYU lands. These water areas should receive a high degree of protection in the future. Minor impacts could be expected adjacent to buffer zones in areas of moist forest floor.
Western Red-bellied Newt Taricha rivularis	6 1-5	1-3	8 1-7	5-6 1-4	4-5 1-3	8-9 1-7	Breeds and feeds in water. Also forages among logs and litter on the forest floor. Proposed buffer zones expected to provide a high degree of protection. Gross yarding of logs and harvest of adjacent forest will result in some impacts. However, all woody debris cannot be removed in timber stands.
Olympic Salamander Rhyacotriton olympicus	7-8 1-6	1-3	8-9 1-7	7-8 1-6	5-6 1-4	8-9 1-7	Closely associated with permanent cold streams and streamsides, seeps or springs. These areas are normally protected however impacts could occur if seeps or springs are altered by logging activities.
Pacific Giant Salamander Dicamptodon ensatus	6-7 1-5	1-3	7-8 1-6	6-7 1-5	5 1-4	7-8 1-6	Similar to Western Red-bellied Newt. In most cases aquatic habitat would receive a high degree of protection. Low impacts are anticipated adjacent to buffer zones from gross yarding of woody debris which provide foraging habitat.
Ensatina Ensatina eschscholtzi	5-6 1-4	1-3	6 1-5	5 1-4	4-5 1-3	7-8 1-6	Similar to above but less dependent on aquatic habitat. Occurs in cool moist timber stands with much ground litter. Much more dependent on downed logs for feeding and breeding. Buffer zones would provide habitat but the species would sustain impacts from gross yarding and timber harvest on adjacent forest floor.
Arboreal Salamander Aneides lugubris	5-6	3	6	5	4	7-8	Not dependent on permanent water but requires moist areas for breeding. May be favored by opening up forests but requires snags, logs and forest debris for feeding and reproduction. Impacts would result from snag removal and gross yarding.
Black Salamander Aneides flavipunctatus	6 1-5	1-3	8 1-7	7 1-6	6 1-5	8 1-7	Preferred habitat along streams and intermittent streams would receive a high degree of protection. Minor impacts may occur on adjacent forest floor particularly in cool damp pockets of timber.

PROPOSED ALTERNATIVES	Proposed Action	No Ø Action	Limited Invest.	Accel. Harvest No. 1 *	Accel. Harvest No. 2 *	Managed Old-Growth	
Amphibians# and Reptiles (Continued)							
Northern Alligator Lizard Gerthonotus coeruleus	7	5-6	7-8	6	5	8	Logging which would open up the habitat would favor this species. However removal of logs and woody debris which provide feeding and breeding habitat would result in impacts.
Rubber Boa Charina bottae	5	3-4	6-7	4-5	4	7-8	Prefers conifer forests adjacent to wet meadows. Also occurs along streams. Requires downed logs in various stages of decay. Reproduces in rotting logs. Overall effects of logging on this species is not well understood.
Sharp-tailed Snake Contia tenuis	4-5	3	5-6	4	3-4	7	Requires loose, moist soil and woody debris including rotting logs. Logging would result in drier, more compacted soil and removal of downed debris needed for feeding and reproduction.
Ringneck Snake Diadophis punctatus	4-5	3	5-6	4	3-4	7	Similar to above. Prefers moist areas and high humidity often on north facing slopes. Also requires downed logs and loose soil. Is fairly versatile occurring in a variety of habitats. Drying of habitat from logging would be detrimental, but would be less with a shelterwood system.
Calif. Mountain Kingsnake Lampropeltis zonata	6	3	7	5	4	7	Prefers moist woods and orients to the vicinity of streams. Requires rotting logs and loose soil for breeding. Feeds on small animals that use logs and other forest debris. Drying of habitat and gross yarding would result in impacts adjacent to buffer zones.
BIRDS							
Goshawk Accipiter cooperii	1	1	1	1	1	2-3	Requires heavy mature forest with understory of younger trees. Often prefers north facing slopes. Occupies a large home range, 4-6 mile radius. Minimum habitat requirement approximately 40 acres but probably more area needed. Highly sensitive to human disturbance. Uses brushy areas for feeding.
Cooper's Hawk Accipiter cooperii	4-5	1	4-5	4	3	6	Nests in young and mature stages of conifers and deciduous trees often near streams. Requires approximately 20 acres of habitat per pair. Also orients to north facing slopes. A minor amount of suitable habitat may remain in buffer zones. As with goshawk above, uses snags and logs as feeding sites.
Golden Eagle ** Aquila chrysaetos	9	9	9	9	9	9	No known nesting on or next to SYU timber base lands. Forages over wide areas up to 93 sq. miles primarily in open vegetation types. Nests in trees and on cliffs. Sensitive to human disturbance near nesting sites.
Bald Eagle ** Haliaetus leucocephalus	9	9	9	9	9	9	No known nesting sites on or next to SYU timber base lands. Prefers large rivers and bodies of water. Few timbered tracts occur next to major waterways. These areas usually receive 1/4 mile buffer zones. Wintering birds may occur sporadically along major waterways.
Osprey Pandion haliaetus	9	9	9	9	9	9	No known nest sites on or near SYU timber based lands. Orients to large water bodies and rivers. See bald eagle above. Special mitigation has been proposed.
Peregrin Falcon ** Falco peregrinus	9	9	9	9	9	9	Occurs throughout the area where associated with suitable nesting cliffs. Feeds heavily in and adjacent to waterways. Sensitive to human disturbance near nest site. Most potential impacts would involve human disturbance during nesting season, February through June.
blue Grouse Dendragapus obscurus	3-4	2-3	4	3	2-3	5-6	Requires dense stands of fir for cover adjacent to open grassy areas and or younger second growth. Uses dense ridgeline stands for winter cover. Grouse use downed logs for feeding and reproduction. Removal of ridgeline stands, trees surrounding meadows and logs would result in adverse impacts.

PROPOSED ALTERNATIVES	Proposed Action	No Ø Action	Limited Invest.	Accel. Harvest No. 1*	Accel. Harvest No. 2*	Managed Old-Growth	
Birds (Continued)							
California Quail Lophortyx californicus	8-10	6-7	9-10	7-8	7	8-10	Prefers more open shrubby areas near water. Timber harvest may result in slight habitat improvement. However, desirable grass-forb stage is not expected to be well developed under shelterwood canopy. Uses logs for feeding and reproduction. The size of proposed sales would not result in a good arrangement of edges and habitat types.
Mountain Quail Oreortyx pictus	8-9	6-7	9	7-8	7	8-9	Prefers brushy areas interspersed with grass. Concentrates near water in summer. Will use cutover areas in young stages of forest succession. Eats fruits, seeds and buds of herbs, trees and shrubs. Uses logs as feeding and reproduction sites. Concentration in brushy areas and riparian areas should generally result in low impacts to these birds.
Band-tailed Pigeon Columba fasciata	2-3	1	3-4	2	1-2	6	Requires tall trees and conifer groves in the vicinity (several miles) of water. Feeds on fruits and berries of trees and shrubs including oak and madrone. Sensitive to human disturbance during nesting. Requires tall perching trees near nest sites. Use fluctuates with food production. Provides prey for peregrine falcon.
Mourning Dove Zenaida macroura	8-9	9-10	9-10	9	9	8-9	Prefers nonforested areas and early stages of forest succession. Slight benefits could accrue from opening up forests, however the desirable grass forb stage is not expected to be well developed under shelterwood canopy.
Flammulated Owl Otus flammeolus	2	1	2-3	1-2	1-2	7-8	Optimum habitat includes late stages of open pine forests and forest grass openings. It is highly dependent upon snags with abandoned flicker cavities for nesting. Uses cutover areas for feeding. Optimum habitat is thought to be limited in SYU. A small amount of habitat may be available in buffer zones.
Pygmy Owl Glaucidium gnoma	2-3	1	3	1-2	1-2	7-8	Similar to above but more versatile in use of various habitats. Unlike the flammulated owl which feeds primarily on insects, the pygmy owl feeds primarily on small mice. Like the above, forest edges with snags and abandoned woodpecker holes are important.
Northern Spotted Owl Strix occidentalis	1	1	1	1	1	2	Requires dense rather closed multilayered canopy of pine or fir. Most territories over 300 acres in size. Intolerant of heat and susceptible to predation by great horned owl in open areas. Highly dependent on large areas of old-growth making proposed buffer zones inadequate for retention of this species.
Saw-whet Owl Aegolius acadicus	2	1	2-3	1-2	1	6-7	Primarily nests and feeds in tall open timber types. Also orients to riparian and oak vegetation. Requires snags with old woodpecker holes for nesting. More versatile in use of habitats than flammulated owl but less so than pygmy owl. A very minor amount of habitat would remain in proposed buffer zones.
Vaux's Swift Chaetura vauxi	2-3	1	2-3	1-2	1	6-7	Nests in large hollow snags. Feeds over mature canopy, canyons and water areas. Could feed to some degree over cut areas if large hollow roosting and nesting sites remain. Prefers late stages of redwood forest in local area, which is limited on SYU lands.
Common Flicker Coloptes auratus	2-3	1	2-3	1-2	1	6-7	Requires dead and dying trees for feeding and breeding. Primary cavity nester in well rotted trees. Feeds extensively on ground and uses downed logs. Also makes use of acorns, seeds and berries. Quite versatile in use of habitat types and successional stages. Important because it provides nesting cavities for a wide variety of secondary cavity users. Orients to riparian areas. Some habitat would remain in buffer zones and "nonproductive" forest. However, territory size per pair of birds is approximately 40 acres. Feeding could occur on nearby cutover and brushy areas. Provides prey for sensitive raptors.

PROPOSED ALTERNATIVES	Proposed Action	No Ø Action	Limited Invest.	Accel. Harvest No. 1*	Accel. Harvest No. 2*	Managed Old-Growth	
Birds (Continued)							
Pileated Woodpecker Dryocopus pileatus	1	1	1	1	1	5-6	Declining with removal of mature timber. Requires tall (40'+) anags over 21" dbh for breeding and ample downed material over 7' dia. for feeding. Also requires trees with heart rot. Is a large primary cavity user which providea large cavities for aecondary cavity users. Alao feeds on berries and nuts of hardwoods. Buffer zones would provide some habitat. Highly susceptible to human disturbance. At present thia bird is quite common and wideapread throughout area inventoried.
Acorn Woodpecker Melanerpes formicivorus	1	1	1-2	1	1	6	Dependent upon snags both in hardwoods and conifers for nesting and food storage. Requires drinking water daily. Feeds on nuts, especially acorns, fruits, seeds, flowers of broad leaved plants. Prefers pine trees and oak vegetation. Is a primary cavity user. Some habitat would remain in proposed buffer zones. Reports indicate average territory size of 15 acres.
Lewis Woodpecker Melanerpes lewis	1	1	1-2	1	1	6	Prefers semi-open stands of pine shrub. Requires snags for nesting and is a primary cavity user. Feeds primarily on insects but also makes use of acorns. Uses riparian and a small amount of habitat would be available in buffer zones and nonproductive forest. Requires approximately 15 acre territory. As yet not frequently observed in SYU area but occurrence expected to be erratic.
Yellow-bellied Sapsucker Syhyrapicus varius	1	1	1-2	1	1	5-6	Optimum habitat mid to late stages of mixed evergreen forest and riparian. Requires snags or live trees with rotten heartwood. Also depends on broad-leaved trees for berries and sap. Needs a mixture of conifers and hardwoods. Is a primary cavity user. Territory size of approximately 10 acres per pair have been reported. Some habitat would remain in buffer zones.
Hairy Woodpecker Picoides villosus	1	1	1-2	1	1	6	Dependent upon snags or live trees with soft heartwood for nesting, feeds on logs, stumps, live and dead trees. Also feeds on fruits, pine seeds and tree sap. A fairly common and widespread primary cavity user and quite versatile in its use of habitat types. Home range per pair is approximately 25 acres. A minor amount of habitat would remain in cut areas where some feeding could also occur.
Downy Woodpecker Picoides pubesens	1-2	1	1-3	1	1	6	Prefers riparian areas and deciduous vegetation. Requires branches and trunks in advanced stages of decay. Also feeds on downed logs and fruits and berries. Is an uncommon primary cavity user in areas inventoried to date. Territory size is approximately 10 acres per pair. Most breeding activity would be confined to buffer areas with some feeding in cut areas.
White-headed woodpecker Picoides albolarvatus	1	1	1	1	1	6	Strongly associated with mature ponderosa pine in semi-open stands. Requires large snag, or pine stump with a hard exterior and a soft interior approximately 2' in diameter at 5-15' high. Is a primary cavity user but not common in inventories conducted thus far. Territory size of 20 acres per pair have been reported.
Hammond's Flycatcher Empidonax hammondii	1-2	1	1-3	1	1	4-5	Occurs primarily in high elevation fir forests in cool heavily timbered areas. Does not invade logged areas. Other use has been reported in Douglas-fir and Jeffery pine. Uses the high level of the forest canopy making inventory difficult. Orients to cool, heavily timbered ravines where some habitat would be available in buffer zones.
Violet-green Swallow Tacycineta thalassina	1-2	1	2-3	1	1	7-8	Uses young open stands of many forest types and open water areas for feeding. Uses old abandoned woodpecker holes for nesting as well as cliffs. Snag availability particularly near water important. Some habitat would remain in buffer zones. Swallows aerve as prey for peregrine falcon.

PROPOSED ALTERNATIVES	Proposed Action	No Action	Limited Invest.	Accel. Harvest No. 1*	Accel. Harvest No. 2*	Managed Old-Growth	
Birds (Continued)							
Tree Swallow Iridoprocne bicolor	1-2	1	2-3	1	1	7	Nests in snags near open areas and riparian areas. Uses hollow trees and abandoned woodpecker holes. Feeds over more open areas including meadows and grasslands. Snags at forest edge important as with the above. Feeds on some seeds and berries. As with above, may nest in groups in same area.
Purple Marten Progne subis	1-2	1	2-3	1	1	7	Similar to above. Habitually nests in old woodpecker holes and natural tree cavities. Requires a source of water. High tolerance to human disturbance around colonial nest trees. Feeding could occur over cut areas.
Stellar's Jay Cyanocitta stelleri	5	3	5-6	3-4	2-3	6-7	Optimum habitat includes a mixture of old growth and various stages of second growth. Feeds on a variety of fruits, seeds and nuts of broad-leaved trees. Uses logs for feeding. Feeding would occur in cut areas but impacts would occur with removal of broad-leaved trees and shrubs. Provides prey for goshawk and peregrine falcon.
Mountain Chickadee Parus gambeli	1-2	1	2-3	1	1	7	Prefers mature stands with ponderosa pine shrub forest. Is a secondary cavity user nesting in abandoned woodpecker holes. Territory size is approximately 3-5 acres per pair. Uses snags in a variety of successional types. General ecology not well understood.
Chestnut-backed Chickadee Parus rufescens	1-2	1	2-3	1	1	6-7	Similar to above but more common throughout SYU. Does feed on some seeds and fruits in upper canopy. Small amount of habitat would remain in buffer zones.
White-breasted Nuthatch Sitta carolinensis	1-2	1	2	1	1	6-7	Prefers mixed conifer forests with hardwoods. Is a primary cavity excavator but will nest in natural cavities and old woodpecker holes. Needs well decayed wood. Moves to low elevations in winter. Eats some seeds and nuts along with insects as does red-breasted nuthatch.
Red-breasted Nuthatch Sitta canadensis	1-2	1	2	1	1	6-7	Similar to above but has been seen more frequently in the SYU area. Some preference for ponderosa pine documented. Excavates its own cavity. Would no doubt remain in low numbers in small buffer zone area. Sometimes invades low lands in winter.
Brown Creeper Certhia familiaris	1-2	1	2	1	1	6-7	Prefers mature stands of coniferous forests. Requires dead or dying trees with loose bark for nesting. Shows some preference for ponderosa pine where they occur probably because of bark configuration on dying trees.
American Robin Turdus migratorius	5	4-5	6	5	4	5	Feeds on fruits and berries of the board-leaved trees and bushes as does the black-headed grosbeak. Versatile in its use of habitat types and successional stages. Serves as prey for the goshawk and peregrine falcon. Moves to lower elevations in winter.
Varied Thrush Ixoreus haevius	2-3	1	3	2	1	3-4	Preferred habitat for nesting is cool damp heavily shaded coastal coniferous forest. Not as common on SYU land as the hermit thrush. Eats berries and nuts of broad-leaved trees and shrubs including madrone and oak. Hermit thrush also uses similar seeds, fruits and berries.
Western Bluebird Sialia mexicana	2	1	3	1	1	6-7	Uses a variety of habitat types including mixed evergreen. Orients to riparian and oak vegetation types. A secondary cavity user of old woodpecker holes and natural snags in live or dead trees. Also eats some fruits and berries. Appears to prefer ponderosa pine in local area. moves downslope in winter. A small amount of suitable habitat would remain in buffer zone and nonproductive forest.
Hermit Warbler Dendroica occidentalis	1-2	1	2-3	1	1	4-5	Requires moderately dense coniferous stands with tall trees for perching and foraging. Buffer zones would provide limited habitat.

PROPOSED ALTERNATIVES	Proposed Action	No Ø Action	Limited Invest.	Accel. Harvest No. 1*	Accel. Harvest No. 2*	Managed Old-Growth	
Mammals							
Marsh Shrew Sorex bendirii	5	1-2	6	4-5	4	7	Requires riparian areas with dense mature conifers and areas of wet forest floor. Forages around and beneath downed logs. Proposed buffer zones anticipated to provide areas of undisturbed habitat. Impacts expected to occur adjacent to buffer zone in areas of wet forest floor.
Shrew Mole Neurotrichus gibbsii	5-6	1-2	6	4-5	4	6-7	Similar to above. Populations declining from effects of logging and grazing. Appears to be more common than the above in SYU land. Requires damp friable soil with high humus content and abundant litter.
Long-legged Myotis Myotis volans	1-2	1	2	1	1	5-6	Uses tree cavities for breeding and feeds in and adjacent to dense mature conifers. Uses other cavities as well and will feed over open areas including water. Nests in colonies. Feeding could occur in cut areas and habitat may remain in buffer zones if suitable roost and nesting trees are present.
Silver-haired bat Lasionycteris noctivagans	1-2	1	2	1	1	5-6	Similar to above. Reproduces in dense mature tree canopy, hollow trees or loose bark and feeds in adjacent more open areas.
Black Bear Ursus americanus	4-5	2-3	4-5	3-4	3-4	5-6	Fairly versatile in use of habitats and successional stages. Does use dense forest stands for breeding. Feeds on fruits and nuts of broad-leaved plants. Also utilizes large logs and tree cavities for denning and rotten logs for feeding. Small remaining stands may provide important habitat diversity in large cutover areas. Impacts would be greatest on breeding habitat.
Raccoon	6	2-3	6-7	5-6	5	7-8	Centers activities along permanent waters. Versatile in use of habitat types and in feeding. Some impacts expected adjacent to buffer zones with removal of logs and broad-leaved food plants. Minimum habitat reported at 2 miles of stream per pair.
Procyon lotor	3-5	1	4-5	3-4	3-4	5-7	Additional impacts could occur with heavy stream siltation resulting in a reduction of stream prey base.
Ringtail Bassariscus astutus	8	4-5	8-9	7	5-6	8-9	Prefers rocky areas in more open brushy vegetation along streams. Feeds primarily on small mammals. Buffer zones expected to provide a high degree of habitat protection. Only minor impacts expected with removal of down logs and broad-leaved plants on adjacent forest floor.
Pine Marten Martes americana	1-2	1	1-2	1-2	1-2	4-5	Little suitable habitat known in SYU. Would most likely occur at higher elevations adjacent to USFS lands in ponderosa pine. One possible sighting near Branscomb. Requires mature stands with hollow trees for breeding. Will also use crevices in rock piles. Forages in a variety of habitats in trees and on ground. Minimum habitat reported at 640 acres per pair. Sensitive to human disturbance. Proposed actions would probably remove any remaining suitable breeding habitat.
Fisher Martes pennanti	1-2	1	1-2	1-2	1-2	3-4	Requires extensive forested tracts with dense canopy closure. Expected to be rare on BLM tracts but could use habitat in conjunction with USFS lands. Possible observations near Branscomb and Elk Creek. Ranges over large areaa (4-5 sq. miles) in Trinity County. Uses brush piles, logs and upturned trees for breeding sites. Feeds on small mammals, birds and also eats fruit.
Mink	7-8	4-5	8	7	6	8-9	Prefers riparian and streamside areas of large streams but forages into adjacent areas. Minimum habitat size reported to be 1 stream mile per pair.
Mustela vison	4-6	1-3	4-7	4-6	4-6	5-7	Additional on and off site impacts could occur with stream siltation and alteration resulting from a major road failure or land slumping. Aquatic prey species would be reduced. Buffer zone expected to provide a high degree of protection normally.

PROPOSED ALTERNATIVES	Proposed Action	No Action	Limited Invest.	Accel. Harvest No. 1 *	Accel. Harvest No. 2 *	Managed Old-Growth	
Mammals (Continued)							
River Otter	7-8	5-6	8	7-6	6	8-9	Similar to above but more strongly tied to large water areas. Minimum habitat requirement reported at 50 stream miles per pair. SYU lands provide little optimum permanent habitat but otters have been observed foraging into some of the smaller streams on BLM.
Lutra canadensis	3-6	1-4	3-7	2-6	1-5	3-7	
Coyote Cunis latrans	9-10	9-10	9-10	9-10	9-10	9-10	Prefers nonforested vegetation types. Minor short term increases in small mammal prey species could occur in cut areas. This may be offset by reductions in berry and fruit producing plants with timber stand improvement.
Grey Fox Urocyon cinereoargenteus	7	6-7	8	6-7	6	8-9	Similar to above but uses logs and bruah piles in forested areas for denning. Prefers riparian and brushy areas.
Mountain Lion Felis concolor	7	6	7-8	6-7	5-6	8	Ranges over extremely broad areas using a variety of vegetation types. Minor impacts might arise from increased human access.
Bobcat Lynx rufus	7	4-5	8	6-7	5	8	Prefers riparian and open brushy stages of most vegetation. Dens under logs and in hollow trees. Feeds on small animals. Territories of over a thousand acres have been noted. Additional access would result in increased human disturbance including trapping.
Mountain Beaver Adlodontia rufa	8	3-4	8	7	5-6	8-9	Requires seepages and streamside thickets. Impacts could occur if timber harvest occurred in seepage and spring areas. Not known to occur on SYU tracts to date.
Western Gray Squirrel Sciurus griseus	3-4	1-2	4-5	4	3	6	Prefers riparian areas and mature stands of mixed evergreen forests with oaks. Uses cavities and old woodpecker holes in snags for reproduction. Feeds on fruits, nuts and forest fungi. A minor amount of habitat would remain in buffer zones and nonproductive forests. Uses downed logs for feeding.
Douglas Squirrel Tamiasciurus douglasii	2	1	2-3	2	1-2	4-5	Similar to above but more dependent on mature conifers for breeding and feeding. Territory size of 100 acres has been recorded. Uses downed logs for cover and feeding.
Northern Flying Squirrel Glaucomys sabrinus	2	1	2	1	1	4-5	Requires mature stages of coniferous forest. Feeds heavily on forest lichens. Also uses seeds and nuts of other trees including oaks. Uses downed logs for feeding. Is a prey species of the spotted owl.
Deer Mouse Peromyscus maniculatus	7	5-6	7-8	6-7	6	8-9	Prefers riparian and more open habitat. Important prey species of a wide variety of predators. Habitat expected to be only slightly reduced by removal of logs and slash.
Dusky-footed Woodrat Neotoma fuscipes	7-8	5-6	8	7	6	8-9	Optimum habitat includes riparian and more open forest stands. Habitat quality would be slightly reduced by yarding and removal of broad-leaved trees and shrubs. Serves as prey for many predators including the spotted owl.
Bushy-tailed Woodrat Neotoma cinerea	6	4-5	6-7	5-6	5	7-8	Similar to above but more dependent on forest trees and downed logs. Feeds on fruits, seeds, and bark of broad-leaved trees along with insects and fungi. Sometimes nests in trees. Some habitat would remain in buffer zones.
Red Tree Mouse Phenacomys longicaudus	1-2	1	2-3	1-2	1-2	4-5	Nests in fairly dense conifer canopy. Forages on fir needles. Home range may include one or several trees which are occupied for extremely long periods. Males nest on ground among debris. Has a low reproductive rate. Serves as prey for spotted owl.
Western Red-backed Mouse Clethrionomys occidentalis	2-3	1-2	3	2	1-2	6	Riparian and dense conifers include preferred habitat. Highly dependent on downed logs for cover, feeding and nesting. Minor amount of undisturbed habitat would remain in buffer zones and nonproductive forest.

PROPOSED ALTERNATIVES	Proposed Action	No Ø Action	Limited Invest.	Accel. Harveat No. 1 *	Accel. Harvest No. 2 *	Managed Old-Growth	
Mammals (Continued)							
Brush Rabbit Sylvilagus backmani	7-8	5-6	8	6-7	5	7-8	Prefers dense brushy areas next to wet meadows. Timber stand improvement along forest edges could result in greater impacts. Serves as prey for a variety of predators.
Black-tailed Deer Odocoileus hemionus	8-10	5-6	8-10	8-9	8	8-10	Optimum habitat consists of riparian and brushy more open stages of most vegetation types. Meadows with adjacent cover important. In some cut areas minor increases in grasses and forbs may be offset by loss of forest escape and thermal cover. Cutting along forest-meadow edge would reduce habitat quality. Removal of shrubs would result in impacts in some stands.

The managed old-growth alternative is weak in that it does not provide specifically for long-term retention of certain broad-leaved trees required by many species of wildlife (Thomas 1979, life form 9). Fruits, nuts, seeds, and berries are important to many species, especially during winter. It is also weak in that the majority of the area would be managed on relatively short rotations of approximately 100 years. This alternative would not in itself provide suitable nesting site habitat for species requiring relatively large areas of old-growth, such as the goshawk and spotted owl. It would result in better feeding habitat than the other proposals for these and other species, including a variety of predators.

In order to provide appropriate mitigation for the wildlife in the SYU 13 area, two approaches should be considered:

1. Relatively large blocks of undisturbed mature and old-growth habitat of known value to wildlife should be reserved. This would be a positive commitment of undisturbed habitat for wildlife that require large areas and for numerous other species that require habitat components produced in an older forest. Mitigation measures applied to intensively managed timber stands can only achieve partial mitigation.

2. For areas committed to intensive timber management, a variety of mitigating measures would be needed for species that can feasibly be retained to varying degrees along with such management.

Reduction of impacts would occur if mitigation measures in Table 4-8 were incorporated to retain or provide various habitat requirements.

Recreation

The no action and limited investment alternatives would have the same impacts on recreation as the proposed action, and the accelerated harvest alternatives would have the same impacts, except they would occur faster.

The managed old-growth alternative would have less impact on aesthetics because of the retention of some old-growth trees. Natural history study and wildlife observations of old-growth-dependent species would also be enhanced.

Natural Areas

The no action and limited investment alternatives would have the same impacts on natural areas as the proposed action. The accelerated harvest alternatives would have the same impacts, except they would occur faster.

TABLE 4-8

PROPOSED MITIGATION - WILDLIFE

1. Old-Growth Reserves

MAJOR RESERVE AREAS	COMMENTS
Laqua Buttes T 3 N, R 2 E BLM portions of Secs. 1 and 2	Not inventoried for wildlife. Contains approximately 200 acres of forest habitat within a large area of private land. Is the northernmost proposed reserve.
Big Bend BLM land in Secs. 10, 14 and 15	Situated along the Mad River. BLM controls very few forested tracts along major waterways. These tracts could provide habitat for otter, osprey, and bald eagle. They would provide habitat for a variety of forest species near a major river amid a large area of private land which will probably always be subjected to intensive timber harvest. This area is located approximately 3 miles from Laqua Buttes. The proximity of these blocks would aid wildlife dispersion between blocks and would contribute to the retention of forest species on both blocks.
Butte Creek T 1 N, R 4 E Portions of BLM land in Secs. 34 and 35 T 1 S, R 4 E Portions of Secs. 1 and 2	Spotted owl and goshawk occur in this area. The reserve should include generous portions of land along both sides of the south and especially the west forks of Butte Creek. Although portions of the area have been logged and additional logging is planned, this area still contains prime old-growth habitat. A significant portion of north-facing slope remains intact. With time, logged portions would regenerate and increase the overall quality of the area. One of the best old-growth tracts known in the SYU.
Antone Creek T 1 N, R 1 W BLM land in Secs. 31 and 32	Not inventoried for wildlife but contains the majority of the headwaters of Antone Creek, a perennial tributary of Bear River. Northerly exposure and permanent water would make this area highly desirable to wildlife and would assure habitat in an area of primarily private ownership and nonforested land.
Davis Creek T 1 S, R 2 W BLM portions of Secs. 8, 9 and 10	Not inventoried for terrestrial wildlife. BLM lands contain a significant portion (approximately 2 miles) of the watershed of this short coastal stream with well developed old-growth. East-west orientations provide favorable north-facing slope. Anadromous fish are present and spawn in the headwaters controlled by BLM. This block, situated approximately 2 miles from Antone Creek, would aid wildlife dispersal between the two and help to insure overall species retention in the area, particularly forest birds.
Coleman Creek T 2 S, R 4 E BLM portions of Secs. 10 and 11	Not inventoried for wildlife. This tract was recommended as a reserve by the public at a BLM meeting to review the scattered blocks MFP. While much of the area is occupied by hardwoods, a well developed mixed-evergreen forest type occurs on north slopes in the Coleman Creek drainage. The public land includes a significant portion of the watershed of this Eel River tributary. Located approximately 1/2 mile from Eel River.
Jewett Rock T 4 S, R 5 E BLM portions of Secs. 27, 33 and 34 T 5 S, R 5 E BLM portions of Secs. 2, 3 and 4	Partially inventoried for wildlife. Area of sufficient size to provide habitat for a variety of forest wildlife. Perennial water is somewhat lacking but contains about 1/4 mile of Pipe Creek.
Charlton Creek T 5 S, R 5 E Portions of Secs. 25 and 26 T 5 S, R 6 E Portions of Sec. 31	Not inventoried for wildlife. The area contains pockets of well developed forest and a northerly creek and slope orientation. Approximately 1-1/2 miles of stream ravine habitat would be available to wildlife.
Cedar Creek T 23 N, R 16 W Sec. 1. Northwest of Leggett.	Spotted owl recorded in the area. Provides approximately 1 mile of northerly stream orientation. Anadromous fish spawn in this side drainage of the Eel River.
Big Butte T 25 N, R 12 W Sec. 22 and West 1/2 of Sec. 23	Spotted owl recorded in this area. Unconfirmed observation of a goshawk nearby. Several creeks including Casoose, Peterptor and Foot-of-Bull-Ridge converge in this area.
White Rock Creek T 22 N, R 14 W Portions of Secs. 7 and 8	Spotted owl recorded in this area. Area contains land along two forks of White Rock Creek that provides several miles of forested streamside habitat.
Elkhorn Ridge West side south fork of Eel River T 22 N, R 16 W BLM land in Secs. 8 and 17 and a portion of BLM land in Sec. 18	Spotted owl observed in Section 17. This area would add an area of forested reserve to the adjacent Nature Conservancy's North Coast Preserve where an owl has been observed. Other options occur approximately 1/2 mile north in Surveyors Canyon where old-growth is present. BLM land pattern along Surveyors Creek is somewhat limited.
Brush Mountain East side of south fork of Eel River T 22 N, R 16 W Sec. 4 and a portion of Sec. 9	Not inventoried for wildlife. Provides approximately 1-1/2 miles of north-facing forest exposure along 2 tributaries of the Eel River near the North Coast Preserve. A major rationale for selecting this area and Elkhorn Ridge is that their inclusion in the Preserve would result in a forest reserve of meaningful size. Providing a large reserve would help assure the retention of numerous wildlife species. The North Coast Preserve is highly significant in preserving natural habitats and attendant wildlife species in Northwestern California and will assure greater importance in the future.
Salt Creek T 21 N, R 13 W Portions of Secs. 14, 22 and 23	Spotted Owl and goshawk observed in this area. Also contains a large concentration of pileated woodpeckers. Contains a portion of a branch of Salt Creek. Provides forest habitat within a large area of private land and poorly forested land.
Ham Pass T 23 N, R 11 W A portion of Secs. 4 and 9	Spotted owl observed in the area. High quality old-growth in Sec. 4 proposed in the accelerated harvest plans. Owl was observed primarily in Sec. 9 but no doubt uses old-growth in Sec. 4. May also use adjacent USFS land.

1. Old-Growth Reserves (Continued)

MAJOR RESERVE AREAS	COMMENTS
Thomas Creek T 23 N, R 11 W A portion of Secs. 4 and 9	Two spotted owls observed in the area. Those owls no doubt also use adjacent areas because portions of the Thomas Creek block have been poorly logged (approximately 1969) and are in poor condition. Logging included portions of the streamside. BLM controls approximately 3/4 mile of the stream near its confluence with the Eel River. About 1/4 mile is in private ownership with the remainder of the headwaters on USFS land. The stream provides spawning area for steelhead trout, and some use by river otter has been recorded. Another spotted owl was observed 1 mile southeast of Thomas Creek next to a BLM 40 in Section 31.
Elk Creek-Soda Fork T 14 N, R 15 W BLM land in Sec. 32	Not inventoried for wildlife. Contains approximately 200 acres of forested land adjacent to Elk Creek and about 3/4 miles of Soda Fork Creek.
Cow Mountain BLM land in the Mayacmas Mountain Range	Timber in this dry area occurs in small stringers along steep stream canyons. Trout occur in several of these streams. These narrow stands provide a major amount of wildlife habitat diversity in an area primarily comprised of brush. These trees also provide a major amount of habitat for all cavity users. They also provide stream shading to maintain habitat for trout and amphibians.

In addition to these major reserve areas that would provide suitable habitat for a wide variety of forest wildlife species, a number of smaller tracts could be set aside for all but the most old-growth dependent species. A list of potential areas is contained in the Scattered Blocks Management Framework Plan in the Ukiah BLM District Office.

Recommendations for selection of old-growth reserves is based in part on information contained in Diamond 1975, 1976; Teborgh 1976; Whitcomb et al. 1976; and LaFollette 1979.

2. Mitigation for Forest Lands Committed to Timber Harvest

A. Snags

COMMENTS	RECOMMENDATIONS
After commitment of a forest tract to intensive timber management, the provisions of snags is one of the most important considerations for the retainment of forest species. Recommendations are based on the needs of the most common and widespread primary cavity users observed in the SYU during 1978 field inventories. Various references were consulted (Bull 1978, Thomas 1979, USFS 1979b, and CDFG no date). The potential 6 snags per acre resulting from the six leave trees as explained in Alt. 5, managed old-growth, would eventually result in a high degree of retention of cavity users throughout the SYU. For this alternative to be of immediate benefit to wildlife, provisions should be made to provide snags upon initiation of this management alternative. The reason so many snags are necessary is, for every snag suitable (various stages of deterioration) for cavity nesters, up to 15 may not be suitable (Bull 1978). However, most all snags are used for perching and feeding by birds and will eventually be used as downed log habitat by a host of forest wildlife.	BLM will provide and maintain an average of 5-6 hard snags per acre (where feasible additional snags should be provided). - Approximately one-half of all snags retained should exceed 21" in diameter and preferably be over 45' in height. While large snags are preferred, advantage should be taken of any snags, particularly during initial harvest and early implementation of snag retention programs. - Snags can be left in small groups or singles to take advantage of existing snags. As snag management proceeds, it is desirable to distribute snags throughout the area. However, it is somewhat more desirable to leave proportionally more snags in the proximity of forest edges and streams. - Providing large cull trees is encouraged as a part of any snag recruitment program and for interim use by wildlife. - Where choice is possible, ponderosa pine is a preferred species for snag retention - All possible efforts will be made to meet snag requirements upon initial timber harvest entry. In some cases this may require leaving a safety zone (a radius of the length of the snag) around its base to protect workers. See glosssary for snag definition.

B. Downed Logs and Debris

It is known that logs and forest debris provide habitat for a wide variety of wildlife and are important to the long term health of the forest environment (Franklin et al. 1979) At present there is no known scientific basis for predicting optimum amounts of logs and debris. It is known that a variety of logs in various stages of decay are desirable (Thomas 1979).	BLM will leave a minimum of 6 downed logs per acre (Thomas 1979). - When harvesting a stand, all presently occurring downed logs will be left in place. If an impassable jumble of logs is present, some can be scattered and, if necessary, removed. - Where the minimum number of logs does not occur, unmerchantable sections of cut cull trees will be left in place or brush piles can be substituted until downed logs can be recruited. - Uncharred logs are preferred since charring hardens the surface and slows decomposition, making them less valuable to wildlife. In this regard, broadcast burning of large araas of the forest floor will be discouraged. - It is desirable to maintain a variety of logs in various stages of decomposition, and orientation along contour lines is preferred (Thomas 1979). - The most desirable logs are at least 17" in diameter and 20' in length.

C. Hardwood (broad-leaved) Tree Retention	
While it is implied that all broad-leaved trees and shrubs could not be removed during timber stand improvement, a more conscious approach to size, number, and distribution should be required to provide plant species and canopy diversity. There are no known criteria for determining acceptable levels of broad-leaved tree retention at this time.	BLM will provide a minimum of five mature broad-leaved trees per acre and a like amount of younger replacement trees. - Species retained will be representative of natural vegetation occurring on the site; however certain plants have greater value for wildlife than others. One such example is black oak (Quercus kelloggii). - Broad-leaved tree retention and recruitment recommendations will be made on a case-by-case basis by a wildlife biologist.
D. Protection of seeps, springs, ponds and meadows	
Seeps and springs are important to wildlife and should receive protection similar to streams. Meadows and forest edges contribute to overall forest habitat diversity and many species require these habitats in close proximity to one another. Naturally occurring wet meadows are especially important. The relatively small size of most timber stands makes the protection of meadows difficult.	Springs and seeps will be protected by 75' of undisturbed buffer zones. Natural meadows will be protected by a minimum 75' buffer zone (measured horizontally). Final width recommendation will depend on density of the stand and other site-specific criteria. A selective harvest may be permitted; however a minimum canopy cover of 50% will remain, and no more than half of the trees with dbh of 21" will be removed. All snags will be retained. The integrity of meadows will not be altered by timber harvest activities, including operation of machinery, falling, yarding, road construction, etc. If on a particular site it is believed that a 75' buffer zone would result in excessive damage from windthrow, the zone should be expanded or cutting should not occur.
E. Stand Management	
Because of the overall small size of timber stands, it is difficult to manage for various stages of succession and thereby provide a continuum of all stages of succession in a local area. Legal difficulty and cost of access to Federal tracts compounds the problem. Consequently, timber harvest proposals are relatively large with frequent entry and would result in much of a timber stand area in one stage of succession. Steps should be taken to retain and/or provide mature and old-growth forest in all harvest areas. This would involve long term planning. Some semblance of a multi-layered canopy should be retained. Maintaining scattered broad-leaved trees would fulfill part of this requirement. However, a variety of conifer species (where possible) should also be considered.	A minimum of 20 acres of mature and/or old-growth forest will be retained in each harvest area. This is especially important where the harvest block is relatively small and contains all or most of the remaining mature timber in an area. Additional area will be required where sensitive species are involved. Attempts will be made to reduce the size of harvest area and stagger cutting cycles to provide a continuum of forest successional stages through long-term planning. When thinning occurs, conscious effort will be made to retain several stems per acre of small or residual conifer trees. This would probably occur naturally since it is difficult to remove all trees during thinning.
F. Specific Species Mitigation	
Sensitive Species (BLM) Spotted Owl If suitable old-growth reserves are not provided, spotted owl habitat can be preserved on a case-by-case basis. These areas would also provide habitat for a great variety of forest dependent species.	Approximately 300 acres of suitable habitat and, where available, more will be provided for each pair of spotted owls. Less area may be provided where habitat use occurs in part on land in other ownership and can be preserved through cooperative effort, (i.e., this would primarily involve the Nature Conservancy's North Coast Preserve and the U.S. Forest Service). Land classified as nonproductive forest can be incorporated if it provides suitable habitat. BLM will maintain a 200' buffer strip along drainages where spotted owls have been observed determined on a site-specific basis. A one-half mile no disturbance zone will be maintained adjacent to nest sites from February through August. BLM will defer planned timber sales where spotted owls have been observed until the nest site has been located (Nietro 1974). Inventory will include two consecutive breeding season (spring-summer) surveys, if necessary, to determine location.

2. Sensitive Species (Continued)	
	BLM will monitor known spotted owl areas every two years. Areas set aside for owl retention will include the following: - the nest site or grove - the permanent water course closest to the nest area - where suitable, the entire hillside from dralnage area to ridgetop. Mitigation recommendations for the SYU are adapted from Jackman and Scott 1975 and contain information from Nietro 1974 and Gould 1974. Much of the information is also contained in Zarn 1974.
Red-legged Frog Little suitable habitat anticipated on SYU land for this species.	If encountered, additional habitat protection may require the expansion of aquatic buffer zones to 200 feet and special precautions in logging the surrounding area (e.g., suspended cable yarding).
California Mountain King Snake Anticipated but not yet encountered on SYU lands.	Proposed buffer zones and downed log recommendations will provide a high degree of habitat protection for this species. No other mitigation proposed at this time.
Osprey No nesting sites known on SYU lands. Minor feeding use could occur on or adjacent to BLM timber stands.	If encountered, nest sites will be protected by a no cut zone 600 feet in diameter and a 200 foot buffer along the remainder of the water's edge (Jackman and Scott 1975). A one-half mile no disturbance zone will be imposed around the nest from February through August.
River Otter Permanent habitat expected to be very limited on SYU lands.	Where encountered, proposed buffer zones will be expanded to 200 feet and special logging methods imposed to reduce land disturbance.
Ringtail Because of habitat preference and proposed buffer zones, very little impact is anticipated.	No further mitigation proposed at this time.
Mountain Lion Due to large territory size and habitat preference, little impact is anticipated.	Any denning areas encountered will be protected from human disturbance by rerouting roads and other measures to reduce human disturbance. Bobcats will also receive the same consideration.
G. Other Uncommon Species Requiring Special protection	
Goshawk This species occurs in low densities with suitable habitat rapidly being lost. If encountered outside of a sizeable reserve area, special habitat protection is necessary.	An undisturbed area a minimum of 40 acres will be maintained around the nest site. Long-term planning should provide for maintaining suitable nesting habitat in the area for the future. As much north facing slope should be included as possible (Jackman and Scott 1975). Ultimate size will depend on the amount of forest in the area. No human disturbance will occur within one-half mile of the nest site from March through August (USFS 1979b).
Cooper's Hawk and Sharp-shinned Hawk Sharp-shinned hawk not known to nest on SYU lands.	Similar to above with a 15-20 acre protection zone (USFS 1979b).
H. Roads	
Road crossings of streams should be discouraged. Often the major cause of stream degradation can be attributed to roads. Streamside zones are also extremely valuable to the widest variety of wildlife in an area (Bull 1978 and Thomas 1979).	Where stream crossings are absolutely necessary, the road will be constructed in such a manner so as to reduce the amount of streamside area involved to a minimum. This would, in part, involve crossing the stream and its buffer zone at a right angle. Roads and trails will not parallel buffer zones.
I. Timber Sale Inventory	
Timber Sale inventory by a qualified biologist is necessary if meaningful site-specific mitigation is to occur and for compliance with various laws and directives (e.g., Endangered Species Act 1973, amended 1978).	Each proposed timber sale and attending road network will be inventoried by a wildlife biologist at an early stage of planning. Biologists from other agencies (e.g. CDFG, USFWS) will be asked to participate in sale area inspection and recommend mitigation. Special effort will be made to determine if suitable habitat is present for other low density species, including pine martin, fisher, red tree mouse and flamulated owl.

The managed old-growth impacts would generally be the same as the proposed action. However, the retention of some old-growth characteristics could reduce loss of some values, such as aesthetics and wildlife species associated with old-growth systems.

Visual Resources

The no action and limited investment alternatives would have the same impacts on visual resources as the proposed action, and the accelerated harvest alternatives would have the same impacts, except they would occur faster. Because of the retention of some old-growth characteristics, the managed old-growth alternative would have substantially less impact.

Socioeconomics

Table 4-9 shows a summary of impacts on social and economic conditions from the proposed action and alternatives. With only minor deviations, impacts from the alternatives would be the same as those from the proposed action.

UNAVOIDABLE/ADVERSE IMPACTS

Soils

PROPOSED ACTION

It is estimated that there could be an unavoidable loss of about 14,825 tons of soil due to road construction, reconstruction, and maintenance. In addition, yarding and other on-the-ground activities would cause an additional unavoidable loss of about 51,930 tons of soil. Topsoil loss from shallow and/or low fertility sites would cause a loss of site productivity affecting both trees and understory vegetation. Impacts caused by topsoil loss would be site-specific and not widespread.

Quantifying unavoidable adverse impacts due to erosion is difficult because natural events, such as mass wasting and surface sloughing, are

TABLE 4-9
SOCIOECONOMICS

SUMMARY OF IMPACTS

Alternative	Yearly Average (MMBF) Humboldt County	Yearly Average (MMBF) Mendocino County	Yearly Average (MMBF) Total	Mill Operation Days (151 MBF/Day Production)	Jobs Contributed (7.1/MMBF) 1/	Percent of Total Lumber and Wood Products Employees (9800)	Indirect Employment (0.26/Direct) 1/	Total Employment	Percent of Total Regional Employment (61,975)	Lumber 2/ Earnings Per MMBF (1979 M Dollars)	Residentiary 3/ Earnings Per MMBF (1979 M Dollars)	Total Lumber and Lumber Related Residentiary Earnings (1979 M Dollars)	4/ Percent of Total Estimated 1979 Earnings
Proposed Action	7.0	2.7	9.7	64	69	0.70	18	87	0.14	1,389.2	207.7	1,596.9	0.21
No Action	5.6	2.2	7.8	52	55	0.56	14	69	0.11	1,117.1	167.0	1,284.1	0.17
Limited Investment	4.7	1.8	6.5	43	46	0.47	12	58	0.09	930.9	139.2	1,070.1	0.14
Accelerated Harvest #1	7.6	2.9	10.5	70	75	0.77	20	95	0.15	1,503.8	224.8	1,728.6	0.22
Accelerated Harvest #2	10.5	4.1	14.6	97	104	1.06	27	131	0.21	2,091.0	312.6	2,403.6	0.31
Managed Old Growth	6.1	2.4	8.5	56	60	0.61	16	76	0.12	1,217.4	182.0	1,399.4	0.18
For Perspective													
Six Rivers National Forest	65.6	-0-	152.55	1,010	466	4.75	121	587	0.95	9,395,177	1,404,693	10,799,870	1.40
Mendocino National Forest	-0-	33.3	81.3	538	236	2.41	61	297	0.48	4,769,198	713,053	5,482,251	0.71

1/ Terrascan 1979, p. 53

2/ $63,540 (1967 base) X 2.254 (Oct. 1979 Consumer Price Index) X MMBF in alternative

3/ $9,500 (1967 Base) X 2.254 (Oct. 1979 Consumer Price Index) X MMBF in alternative

4/ Total ÷ $\frac{\text{1977 Earnings}}{\text{1.861 (Dec. 1977 CPI)}}$ X 2.254 (Oct. 1979 CPI) = Total ÷ $\frac{638,800}{1.861}$ X 2.254 = $\frac{\text{Total}}{773,700}$

not always distinguishable from the erosion caused by road construction and yarding.

Revenue from the small timber sales included in the proposal limits the amount of money that can be spent on road construction or major relocation. Construction practices such as paving, gabions, crib walls, and bridges are technically feasible mitigating measures, but they are not always economically feasible. So, even though 15 to 25 percent of the erosion could be reduced by these engineering measures or by major relocation of rights-of-way, the measures are not feasible, and erosion is therefore unavoidable.

Soil compaction from logging operations would cause an estimated 25 percent reduction in tree seedling growth on about 334 acres. Quantifying the effect of the compaction on seedling growth is difficult because it varies greatly between soils and tree species. There is, however, a consistent trend toward a reduction of both seedling root length and leader growth.

Growth on individual trees also could be adversely affected by compaction, ranging from a small reduction in growth to over 40 percent loss. Furthermore, these compacted soils have a moisture permeability of up to 35 percent lower than undisturbed sites (Dodge et al. 1976). So, when the rainfall intensity exceeds the infiltration rate, overland flow and the probability of soil erosion is likely and unavoidable.

ALTERNATIVES

Unavoidable adverse impacts for all alternatives would be similar to the proposal. Tons of erosion due to yarding and roads would vary along with acres affected by soil compaction (Table 4-6).

WATER

PROPOSED ACTION

Prior to mitigation the proposal would place an estimated 4.2 acre-feet of sediment into the various stream systems. By mitigating some of the adverse impacts, sediment yield from yarding could be reduced by an estimated 30 percent and sediment from road construction 10 percent. Therefore, the 4.2 acre-feet of sediment under the proposal would be reduced to 3.1 acre-feet.

Eroded soil (sediment) is a complex of rock particles, organic matter, bacteria and fungi, soluble minerals, and chemical compounds. The interaction of these materials in water with the addition of sunlight causes an unavoidable increase in stream temperatures and biological activity with a decrease

in dissolved oxygen. An unknown but significant amount of soil nutrients would also be flushed into the stream systems.

Recovery to normal runoff and sediment yield conditions would be slow because the disruption of the nutrient cycle caused by harvest and construction disturbance would reduce the site potential, and compacted roads would be a permanent feature of the landscape.

ALTERNATIVES

Residual impacts for the alternatives would be similar to the proposed action. Degree of impact would vary with the miles of road built and number of acres yarded.

VEGETATION

The only unavoidable adverse impacts to vegetation from the proposed action and alternatives would be the loss of growing space due to road construction and the long-term decrease in site productivity because of compaction and erosion.

WILDLIFE

With the exception of managed old-growth, all alternatives, including the proposed action, would result in greatly impoverished habitat for forest-dependent wildlife located on the SYU 13 timber base. Many of these species are being impacted by timber management in other areas of the West (Thomas 1979).

The managed old-growth alternative would provide many of the important habitat components required by mature and old-growth forest species. It would not provide suitable habitat for species that require relatively large areas of old-growth. Mitigation is proposed for several of the more sensitive species that require large habitat areas.

Table 4-10 summarizes the residual impacts on important habitats, habitat components, and wildlife species.

RECREATION

Timber harvest on public lands would have an impact on the recreation experiences that depend on a natural or natural-appearing environment. Aesthetic values would be lowered, natural qualities lost, and solitude destroyed.

TABLE 4-10

Residul Impacts on Important Habitats, Habitat Components, and Species

Habitats, Habitat Component, or Species	Comments
Snags	For all alternatives, approved mitigation for provision of snags (5-6 per acre) is contingent upon their being present(available) in the stand. With cutting cycles of 70-100 years large desirable snags would not be allowed to develop. The managed old-growth alternative would actively recruit an acceptable number of large snags over time by allowing superdominant leave trees to mature and convert to large snags. These snag densities would virtually eliminate the availability of snags as a limiting factor. However, where snags are not presently available, this could require long periods of time.
Down Logs and woody debris	Similar to above. With managed old-growth, large down logs would be recruited from snags resulting from the superdominant leave trees. Gross yarding would not occur with managed old-growth but some woody debris would be removed by spot burning. Because a major objective of the alternative is to retain large woody material, acceptable numbers of down logs would be available in the managed old-growth alternative
Broad-leaved Trees and Shrubs	In most stands overall numbers of broad-leaved plants would be reduced. This would result in residual impacts to wildlife most dependent on these plants. Approved mitigation provides for 5 mature and 5 younger broad-leaved plants per acre, where available. These plants, depending on species and size, would provide varying amounts of food and reproductive habitat for forest wildlife and would result in slight improvement in all alternatives. Broad-leaved trees would provide maximum mitigation and reduction of residual impacts in the managed old-growth alternative where they would ultimately be present with a complex of other habitat components, including large snags, large down logs, and large superdominant leave trees. It is anticipated that this would result in reduction of residual impacts and improve habitat conditions up to one impact evaluation category (Table 4-7).
Stand Structure	Stand structure, primarily related to variety and age of canopy, would be almost uniform in all alternatives except managed old-growth. Some broad-leaved canopy would occur in all alternatives. In addition, the managed old-growth alternative would contain the taller canopy of the superdominants and older snag recruitment trees on each acre. All other alternatives would allow the canopy to develop only to approximately 70-100 years of age. Although natural stand structure would be highly altered, resulting in residual impacts, maximum mitigation would occur in the managed old-growth alternative where the best complex of other habitat components would also be present. Considered along with this complex in the managed old-growth alternative, a slight reduction of residual impacts and improvement in habitat conditions would be expected, primarily within one impact evaluation category (Table 4-7). As a group, birds would benefit the most.
Meadows, Springs, Seeps	All alternatives would provide a reasonable amount of protection for these areas, including the provision for expanding buffer zones in high quality areas such as wet meadows. Various residual impacts would remain particularly for species that prefer forest edges and would vary depending upon the quality of the particular site. Mitigations approved for Soil and Water would add a measure of protection for these areas. (See mitigation Table 2-4).
Buffer Zones (Streamsides)	All alternatives would provide a reasonable minimum protection zone except during periods of high intensity rain storms. During these periods, roads and stream crossings could fail and land slumping might occur. Many of these residual impacts would occur regardless of buffer zones, and common waterways would be affected by actions on adjacent lands not under federal jurisdiction. Mitigations approved for Soil and Water would provide additional protection for aquatic habitats, particularly the 30-foot protection zone for small ephemeral drainageways. As habitat reserves, these areas would provide only limited undisturbed habitat for wildlife. Although residual impacts would remain in these areas, all alternatives contain the provision for expanding buffer zones to protect habitat occupied by certain sensitive species (see sensitive species mitigation). Other wildlife would also benefit in these areas. Of the alternatives, managed old-growth would result in maximum reduction of residual impacts and benefits to wildlife since the most desirable complex of important habitat components would occur adjacent to the buffer zones.
Sensitive Species Considerations	All alternatives propose provisional protection for sensitive species. Habitat would be protected provided it is occupied by the various sensitive species. Therefore, this is not a positive commitment of habitat for wildlife should the area for many reasons become unoccupied. Where habitat is protected for the sensitive species, a variety of other wildlife would also benefit. In some cases, availability of federal land in an area may preclude BLM from providing adequate habitat protection. For example, of the 15 spotted owl observation areas known at this time, approximately one-third could not be afforded adequate protection by BLM.
Old-Growth Habitat Reserves	Reserve areas are a positive commitment to use by wildlife and would not be subject to most of the impacts, including residual, associated with intensive timber management. Prior commitments have been made and others proposed to forego timber management in productive stands throughout the area for a variety of reasons (Map 2-2, inside back cover pocket). While the majority of these areas have not been reserved specifically for wildlife or to mitigate specific problems, wildlife would benefit from these actions. Further positive commitments to wildlife in the form of reserves have not been made for the present timber base (approximately 48,682 acres) but are recommended as other possible mitigation.

Natural Areas

If a tract of public land is allocated to timber management, the impacts on natural area values are all essentially unavoidable. The removal of timber from forested tracts destroys the integrity of the intact ecosystem--the quality which constitutes the natural area value.

Cultural and Sociocultural Resources

Any alteration of the earth's surface where cultural resources are present results in degradation of site integrity or destruction of its scientific and educational value.

Some buried cultural resources could be inadvertently destroyed by timber management activities due to the fact that they were not discovered during the inventory process.

Certain indirect impacts to the resource base might be unavoidable. These impacts would be caused by erosion from construction and harvesting and increased access to workers, recreationists, unauthorized collectors, and off-road vehicles.

Any excavated sites would suffer information loss due to the limitations of current archaeological techniques. Excavation is essentially a destructive process, allowing little or no opportunity to recover at a later date information lost in the original effort.

If sociocultural sites are not identified by Native Americans during the review process, they may be inadvertently impacted by timber management activites.

Direct impacts on sociocultural sites will be mitigated to the maximum extent possible, however these measures may not prevent all indirect impacts. Unavoidable indirect impacts may be caused by erosion, increased access to vandals, and unauthorized off-road vehicle use.

Visual Resources

Many of the adverse impacts of timber harvest are unavoidable. The landscape would be significantly altered, even with mitigation.

Land-Use Plans

Sale and removal of timber from tracts classified for exchange would diminish their usefulness to the King Range land acquistion program. For the period of the timber sale contract (historically 3 years) BLM would not consider transfer of these tracts to private ownership via exchange. With a large investment in easement acquisition, road construction, and forest development, it is likely the Bureau would seek to retain these tracts.

Socioeconomics

PROPOSED ACTION

Obtaining public access against the wishes of the private landowner and resulting trespass problems that could occur would be residual impacts. Although in many cases property values are increased by a permanent exclusive easement, which requires BLM to maintain the road, it is possible that private lands that are transected by public access would have a lower market value than a similar piece of property that is totally private. Many of the landowners perceive that the personal land value declines with BLM access.

ALTERNATIVES

The unavoidable adverse impacts that would result as a consequence of the no action and limited investment alternatives would be the same as the proposed action to a marginally smaller degree. Impacts as a result of the accelerated harvest and managed old-growth alternatives would be the same as the proposed action to a marginally larger degree.

RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Soils

PROPOSED ACTION

The major soil trade-off that would affect long-term productivity would be from road construction. Erosion in the form of mass wasting, surface

sloughing, rills, and gullies would affect on-site forest productivity and downstream water quality. While erosion resulting from yarding lasts only a few years, erosion from roads, especially mass wasting and surface sloughing, could occur for many years.

Soil compaction from yarding would have a long-term effect on tree growth. For example, a study found a 13 percent reduction in tree height and a 53 percent reduction in volume on sites 26 years after compaction (Perry 1964). Compaction is more persistent in clayey soils than coarse textured soils and could last a few decades. Therefore long-term potential for growth loss appears to be substantial.

ALTERNATIVES

With the exception of managed old-growth, the other alternatives would have impacts similar to those from the proposal. Over the long-term period of sustained yield, the managed old-growth alternative would create a more productive forest site. Soil productivity would be better maintained due to less erosion, cooler temperatures, accumulation of organic matter, and increased soil moisture in the surface soil.

WATER

PROPOSED ACTION

With a probable 5 percent annual reduction after timber harvest, water yield would return to the preharvest level after approximately 20 years.

ALTERNATIVES

In the short-term the alternatives would reduce water quality and increase water yield by an undeterminable amount. However, it does not appear that long-term overall effect on water quality would be cause for concern.

VEGETATION

In the long-run all 48,682 acres of the existing timber production base (54,247 on the no action alternative) would be cut and converted to young stands.

Under regulation the annual allowable cut would be increased to about 20 MMBF for the proposed action and accelerated harvests. It would be slightly less for managed old-growth and no action and much less for limited investment.

Only the managed old-growth alternative would retain some old-growth characteristics. The other alternatives would lower the age at which the trees are harvested, which means the old-growth would never be replaced. Because of the shelterwood harvest techniques, all of the alternatives would eliminate the early seral stages normally associated with disturbances in the forest. The forest would not go through the grass-forbs stage of succession.

While there is a difference in the acreage lost because of road construction in the 10-year period, in the long run, when all road construction on the timber production base is complete, this acreage would be about the same.

SENSITIVE, ENDANGERED, AND THREATENED PLANTS

Any impacts on a population of sensitive, endangered, or threatened species would be long-term. Loss of old-growth habitat is perpetual.

WILDLIFE

Short-term impacts of the proposed timber management would result in long-term impacts to forest-dependent species. Short-term for wildlife is considered to be the time required to permanently remove all or most of the old-growth forest from the timber base. With the exception of the managed old-growth alternative, in which some trees (12 to 13 per acre) would be allowed to reach maturity, the lands in the timber base would never attain an old-growth condition or retain any old-growth components. This would result in the permanent loss or a great reduction in habitat quality for a wide variety of wildlife, such as the spotted owl, goshawk, red tree mouse, red-backed mouse, squirrels (including the flying squirrel), pine marten and fisher (if present), all of the primary and secondary cavity users, and other species present but not used for evaluation.

Figure 4-3 illustrates the rate at which old-growth would be removed and made unavailable for use by wildlife. Actually, habitat would be made unsuitable at a much faster rate than indicated in the graph, because portions of some stands would be cut, and the remaining area would not be suitable in size to retain certain old-growth species. Significant loss would occur by the third decade (in 30 years).

During the short-term implementation of timber management plans, it is especially important to provide adequate habitat in an attempt to retain resident species. Less mobile species displaced during short-term implementation would have extreme difficulty in recolonizing the small scattered forest

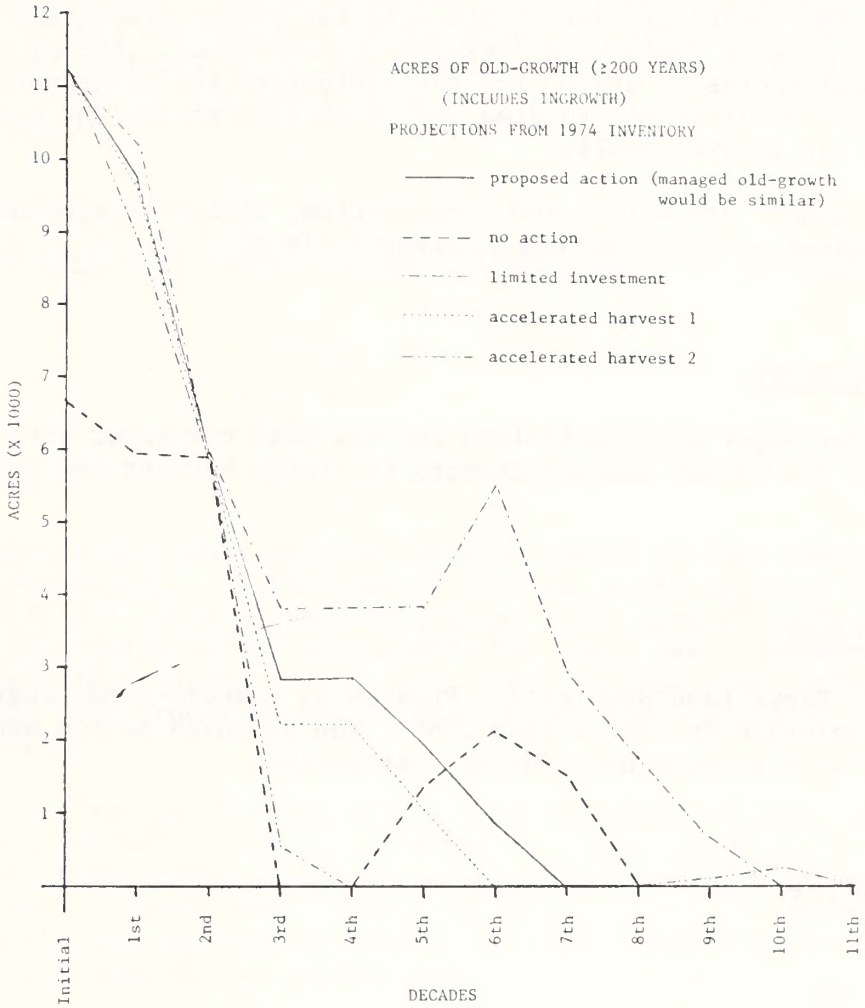

FIGURE 4-3 Loss of old-growth habitat from the timber production base resulting from the proposed action and alternatives.

tracts and may be lost altogether. Rehabitation of BLM tracts by birds would be assured along the eastern boundary of SYU 13 as long as extensive forest remains on the U.S. Forest Service lands.

Cultural and Sociocultural Resources

The primary impacts on cultural and sociocultural resources would probably occur during the short-term use of the area for timber production. However, some of these impacts could have long-term consequences. Access roads could become habitual routes of travel for recreationists and other users of the area. It could be difficult to stop use of certain routes and possible vandalism by the general public.

Without proper protection and preservation, timber management could destroy important cultural and sociocultural sites.

Visual Resources

Except for major changes in land surface that can occur with road construction, most of the visual changes created by timber harvest can heal substantially in time.

Land-Use Plans

The King Range Land Acquisition Program is a short-term program with a projected completion in fiscal year 1985. The proposed action and alternatives would affect this program only during that period.

Socioeconomics

PROPOSED ACTION

The short-term harvesting of timber would result in a long-term loss of unique ecosystem and primitive area values. On the other hand, these areas would be accessible to public recreation, which may not otherwise have been possible.

ALTERNATIVES

Short and long-term impacts on the social and economic conditions under the no action and limited investment alternatives would be the same as the proposed action to a marginally smaller degree. Impacts under the accelerated harvest and managed old-growth alternatives would be the same as the proposed action to a marginally larger degree.

The accelerated harvest #2 alternative would not result in a sustained-yield timber management program. However, since income, earnings, and population impacts of this alternative and the proposed action are not as great as the year-to-year variability in timber harvest, the drop in this alternative's production in 30 years to a level below the proposed action would not have a significant impact.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Soils

PROPOSED ACTION

Mass movement and other types of erosion caused by road construction and yarding are irreversible. While much of the soil would be moved downslope and remain available for use by vegetation, about 7,340 tons of sediment would enter the stream system and be unavailable for plant use. Therefore, there would be irreversible losses of soil and nutrients that could adversely affect not only site productivity for tree growth but also water quality and fisheries habitat.

The road surface on 57 miles of new road construction would constitute an irretrievable commitment of about 138 acres of productive forest soils. In all likelihood, these roads would not be returned to production because of future road needs. Losses from other areas disturbed by road construction (about 61 acres), such as cuts and fills, while not irretrievable, would be a long time in returning to full production.

ALTERNATIVES

The alternatives to the proposal would have similar irreversible and irretrievable commitments of resources. Sediment yield and acres of productive forest lost would vary for each alternative depending on acres yarded and miles of road built. However, after a period of years, all of the alternatives, including the proposal, would have about the same irretrievable loss of productive forest land due to roads.

WATER

PROPOSED ACTION

Sediment delivered to a channel is an irreversible and irretrievable loss of an important resource and results in degradation of both water quality and stream aesthetics. An irretrievable commitment of 7,340 tons of sediment would result from the proposed action. With 57 miles of new road construction, approximately 199 acres of porous forest floor would be compacted and produce high runoff and sediment.

ALTERNATIVES

Once part of the soil resource is detached and transported to the stream, it is gone from the site and the stream is further degraded by sediment.

VEGETATION

The loss of productive forest land because of road construction is irretrievable. The roadbed cannot be restored to its former productivity.

The loss of old-growth is essentially irretrievable, although if the rotation were extended any time in the future to 200 years or older, the old-growth forest could eventually become re-established. None of the alternatives consider such a program.

SENSITIVE, ENDANGERED, AND THREATENED PLANTS

It is possible that a population of sensitive, endangered, or threatened species could be overlooked during survey and inadvertently destroyed during timber management activities. Such a loss would be irretrievable.

WILDLIFE

All of the alternatives propose to permanently remove existing and potential mature and old-growth forest habitat from the lands in the SYU 13 timber production base. These lands occur as relatively small islands. As a result, larger areas in northwestern California would be devoid of mature and old-growth forest habitat.

Recreation

The loss of a natural or natural-appearing environment is essentially irretrievable.

Natural Areas

The destruction of old-growth forest environment is essentially irreversible in a reasonable time frame. A minimum of 200 to 300 years would be required to re-establish such an environment.

Cultural and Sociocultural Resources

Any loss of cultural or sociocultural resources due to any aspect of timber activities would be irretrievable.

Cultural and sociocultural sites represent a nonrenewable and irretrievable resource. Any loss of sociocultural sites is considered irretrievable; they cannot be replaced or restored.

Land-Use Plans

Timber sale layout, easement acquisition, and other commitments of time and monies on timber management and development would result in loss of potential exchange base for the King Range Land Acquisition Program.

Socioeconomics

PROPOSED ACTION

Once areas are logged, the values to the population segment desiring old-growth ecosystems on BLM-managed lands would be lost. Once public access is gained it is not easily reversible.

Irreversible and irretrievable commitments as they apply to social and economic conditions under the no action and limited investment alternatives would be the same as the proposed action to a marginally smaller degree. Commitments under the accelerated harvest and managed old-growth alternatives would be the same as the proposed action to a marginally larger degree.

OTHER POSSIBLE MITIGATION

SOILS/WATERSHED

Roads that have not performed well should be put to bed and replaced by designed roadways that would stay in place without excessive maintenance.

New entry or re-entry into timber sale blocks often reveals critical watershed and associated resource management problems that could be corrected at the time of timber harvest or in post-harvest improvement activities. The Bureau should negotiate contracts with the timber purchaser to remedy these problems.

VEGETATION

The BLM should establish seed orchards in cooperation with private individuals and/or other agencies.

WILDLIFE

Relatively large blocks of undisturbed natural and old-growth forest should be reserved with a positive commitment to wildlife. These reserves would also provide undisturbed habitat for numerous other species that require habitat components produced in old-growth stands.

The most desirable characteristics would include areas that already contain well-developed old-growth and are occupied by species most dependent on old-growth. The areas should also contain a nearby perennial stream and a northerly exposure.

Other BLM blocks containing sizeable areas of old-growth, including those removed from the timber production base by TPCC, as well as cutover portions could be reserved and allowed to redevelop desirable old-growth characteristics. These reserves should be distributed throughout SYU 13.

In other cases, smaller areas could be reserved as a group. This aids the dispersion of wildlife between blocks and aids overall retention of wildlife species on all blocks in a local area. Small areas could be added to already established reserves or land in other federal or private ownership.

Because of an incomplete inventory, it is difficult to recommend all of the most desirable reserve areas at this time. However, sufficient information is available to make the recommendations contained in Table 4-8.

Recreation

Timber harvest should be excluded from the main block of the Cow Mountain Recreation Area.

ENERGY

Energy Requirements

Quantification of the energy requirements for the proposed action and alternatives is highly variable, primarily because of the many unknowns associated with timber management activities. Some of these unknowns are:

- -Buyer of the timber or successful contract bidder.
- -Destination of the timber (extreme variations occur in transportation route lengths due to market conditions or buyer's projections of market trends).
- -Various mill efficiencies.
- -Type, age, and condition of logging equipment.
- -Type, age, and condition of road construction equipment.
- -Origin of work force.

In the short run, energy requirements for the 10-year period, as detailed in Table 4-11, would be proportional to the discrete actions of the proposal and the alternatives. In the long run, assuming technological advances in equipment and mill efficiencies, the energy consumption of the proposal and alternatives should decrease when all roads are constructed and the entire timber production base comes under intensive management.

TABLE 4-11

ESTIMATED ENERGY REQUIREMENTS
(Million Btu's)

	PROPOSED ACTION	NO ACTION	LIMITED INVESTMENT	ACCELERATED HARVEST #1	ACCELERATED HARVEST #2	MANAGED OLD GROWTH
Roads						
New Construction	104,880	79,120	66,240	104,880	145,360	90,160
Reconstruction	56,400	54,000	47,400	60,000	84,000	54,000
Log Production (all actions taken to cut trees and get logs to the mill)	1,067,000	858,000	715,000	1,155,000	1,606,000	935,000
Slash Disposal	2,104	1,885	1,566	2,104	2,953	1,941
Planting	8,537	3,922	3,267	8,940	11,730	7,301
Site Conversion	4,830	220	0	4,830	6,450	4,550
Timber Stand Improvement	507	109	0	507	758	507
Precommercial Thinning	687	0	0	687	1,029	687
Fertilization	686	0	0	686	686	686
TOTAL	1,245,631	997,256	833,473	1,337,634	1,858,966	1,094,832

Sources: BLM data for assumed energy requirements was derived from data furnished by Frank Brown, U.S. Department of Energy, Region X as published in the Jackson Klamath SYU EIS

Conservation Potential

Although the energy requirements of the proposed action and alternatives are small compared to energy consumption in California, and forest residues will probably never become a significant, widespread energy source (Baker 1976), forest management has a relationship to energy conservation by increasing the utilization of energy-efficient materials and by helping to decrease the use of energy-intensive materials (Saeman 1976).

Wood is many times more energy-efficient than other structural materials such as metal, stone, and clay (Granthan and Ellis 1974 and California Energy Commission 1979). Therefore, the proposed action and alternatives would help conserve energy by providing energy-efficient materials to the market.

BLM could, in a minor way, contribute to energy efficiency by:

1. Selling fewer, larger timber sales that would increase the efficiency of the move-in costs and fuel consumption.

2. Scheduling joint sales with the U.S. Forest Service to increase the efficiency of move-in costs and contract administration.

3. Constructing roads to high standards to minimize maintenance.

4. Making positive efforts to use forest residues as fuel through firewood sales.

5. Using silvicultural methods that favor more natural stand and site maintenance rather than using energy-intensive methods.

6. Increasing timber utilization through directional falling to decrease breakage.

Conclusion

The energy consumption attributable to the proposed action would be 1.246 trillion Btu's for the 10-year period. If these Btu's were all expended in the form of gasoline, it would equate to 9.9 million gallons. By comparison to the California 1977 energy consumption of 6.3 quadrillion Btu's (6.3×10^{15} Btu's which is equivalent to 50 billion gallons of gasoline) (California Energy Commission 1979), the proposal's entire 10-year requirement would represent .0198 of 1 percent of the State's 1977 energy consumption.

As previously mentioned, the variability involved in the timber management program for SYU 13 limits the accuracy of energy requirement quantification. Future estimates of energy requirements should be completed on a site-specific basis as a part of the environmental assessment process. This approach would allow the generation of more meaningful data.

PREPARERS AND REVIEWERS

5

CHAPTER 5

PREPARERS AND REVIEWERS

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Name: William E. Rus
Job Title: Access Specialist, BLM, Ukiah District Office

Name: Adrian D. Swensen
Job Title: Staff Forester, BLM, Ukiah District Office

Name: Stanley R. Whitmarsh
Job Title: Outdoor Recreation Planner, BLM, Ukiah District Office

REVIEWERS

Name: Dale Bays

Job Title: Economist, BLM, California State Office

Education: B.S., Forestry

Experience: Forester, BLM, 2 years; Economist, BLM, 7 years

Name: William Olsen

Job Title: Archaeologist, BLM, California State Office

Education: B.A., Social Services
M.A., Anthropology

Experience: Cultural Resource Management, State of California, 16 years; Archaeologist, BLM, 5 years

Name: William Payne

Job Title: Environmental Specialist, BLM, California State Office

Education: B.S., Forestry

Experience: Forester, Bureau of Indian Affairs, 6 years; Environmental Coordinator, BLM, 4 years

Name: Kai Petersen

Job Title: Staff Forester, BLM, Washington Office

Education: B.S., Forestry

Experience: Forester, BLM, 17 years

Name: William Radtkey

Job Title: Wildlife Biologist, BLM, California State Office

Education: B.S., Wildlife Management

Experience: Wildlife Biologist, BLM, 18 years

Name: Deane Swickard

Job Title: Chief, Environmental Coordination Staff, BLM, California State Office

Education: B.S., Wildlife

Experience: Environmental Science, BLM, 9 years

Name: Marty Townsend

Job Title: Soils Scientist, BLM, California State Office

Education B.S., Soils Science

Experience: University of Nevada, 2 years; Soil Conservation Service, 13 years; Soil Scientist, BLM, 10 years

Name: Dick Vernimen

Job Title: Endangered Species Coordinator, BLM, Washington Office

Education: B.S., Wildlife Management

Experience: Indiana State Department of Fish and Game, 1 year; Wildlife Biologist, BLM, 13 years; Endangered Species Coordinator, BLM, 3 years

Name: Buck Waters

Job Title: Pesticide Specialist, BLM, Washington Office

Education: B.S., Entomology
M.S., Entomology

Experience: Technical Service Representative, Private Industry, 4 years; Entomologist, University of New York Agricultural Experiment Station, 3 years; Environmental Protection Specialist, Environmental Protection Agency, 1 year; Pesticide Specialist, BLM, 3 years

Name: Hal Westover

Job Title: Forest Management Specialist, BLM, California State Office

Education: B.S., Forestry

Experience: Forester, BLM, 25 years

AGENCIES, ORGANIZATIONS, AND PERSONS RECEIVING A COPY OF THIS STATEMENT

6

CHAPTER 6

AGENCIES, ORGANIZATIONS, AND PERSONS RECEIVING A COPY OF THIS STATEMENT

FEDERAL AGENCIES

Congressional Delegation

Donald H. Clausen, Santa Rosa, CA and Washington, D.C.

S. I. Hayakawa, San Francisco, CA

H. T. Johnson, Roseville, CA

Department of Agriculture

Forest Service, Washington, D. C.

Mendocino National Forest, Willows, CA

Pacific SW Forest and Range Experiment Station Arcata, CA

Six Rivers National Forest, Eureka, CA

Soil Conservation Service, Ukiah, CA and Washington, D.C.

Department of Defense

Army Corps of Engineers, San Francisco, CA

Department of Energy

Office of Environment, Washington, D.C.

Department of the Interior

Bureau of Indian Affairs

Fish and Wildlife Service, Sacramento, CA and Washington, D.C.

Heritage Conservation and Recreation Service Washington, D.C.

National Park Service, Washington, D.C.

Redwood National Park, Crescent City, CA

Water and Power Resources Service, Washington, D.C.

Environmental Protection Agency, San Francisco, CA

Office of Federal Activities, Washington, D.C.

Office of Architecture and Environmental Preservation

Advisory Council on Historic Preservation, Washington, D.C.

CALIFORNIA STATE AGENCIES

Coastal Commission, Eureka

Department of Conservation, Sacramento

Department of Fish and Game, Eureka and Yountville

Department of Forestry, Ukiah, 776 S. State & 2690 N. State, and Upper Lake

CALIFORNIA STATE AGENCIES (Continued)

Department of Water Resources, Sacramento

Humboldt State University

Native Plant Society, Arcata

School of Natural Resources, Arcata

Office of Planning and Research, Sacramento

Regional Water Quality Control Board

Central Valley, Sacramento

North Coast, Santa Rosa

State Clearinghouse, Sacramento

State Legislature

Doug Bosco, Eureka

Ray Johnson, Redding

Barry Keene, San Rafael

Stan Statham, Redding

State Lands Commission, Sacramento

LOCAL AGENCIES

Del Norte County

Administration and Personnel, Crescent City

Library, Crescent City

Humboldt County

Library

Ferndale

Fortuna

Garberville

Eureka

Trinidad

Public Works, Eureka

Lake County

Library

Lakeport

Upper Lake

LOCAL AGENCIES (Continued)

Mendocino County

- Archaeological Commission, Ukiah
- Extension Forest Advisor, Ukiah
- Library
  - Fort Bragg
  - Ukiah
  - Willits
- Long Valley Justice Court, Leggett
- Planning Commission, Ukiah

Sonoma County

- Department of Planning
- Library
  - Cloverdale
  - Healdsburg
  - Northwest Santa Rosa
  - Petaluma
  - Sonoma County, Santa Rosa
  - Sonoma Regional, Sonoma
- Regional Parks, Santa Rosa

Trinity County

- Board of Supervisors, Weaverville
- Library, Hoopa
- Planning Commission, Weaverville

ORGANIZATIONS

Advocate News, Fort Bragg, CA

Aero-Marine Research, Arcata, CA

Arcata Redwood Co., Arcata, CA

Associated California Loggers, Sacramento, CA

Bear Creek Ranch, Eureka, CA

Bear Creek Water Association, Whitethorn, CA

Branscomb Rifle and Pistol Club, Laytonville, CA

Brown Investment, Ruth, CA

Buck Mountain Ranch, Covelo, CA

California Federation of Mineralogical Societies, Fort Bragg, CA

CAL Trout, San Francisco, CA

California Wilderness Coalition, Davis, CA

ORGANIZATIONS (Continued)

CEMR, Resource Projects, Ukiah, CA

Chambers Logging Co., Inc., Fortuna, CA

Citizens Committee to Save our Public Lands, Willits, CA

College of the Redwoods, Eureka, CA

Concerned Citizens Coalition, Redway, CA

Cultural Resource Management, Inc., Davis, CA

Drewry Ranch, Garberville, CA

Eel River Sawmills, Inc., Fortuna, CA

Far West Motorcycle Club, Eureka, CA

Friends of the River, No. Coast Chapter, Arcata, CA

Georgia-Pacific Corp., Resources Manager, Fort Bragg, CA

Gunn Ranches, Napa, CA

Harwood Products, Branscomb, CA

Healdsburg Tribune, Healdsburg, CA

Hidden Springs Ranch, Leggett, CA

Int'l. Woodworkers of America 3-469, Fort Bragg, CA

Island Foundation, Covelo, CA

KSRO Radio Station, Santa Rosa, CA

League of Women Voters of Humboldt Co., Eureka, CA

Madrone Audubon Society, Santa Rosa, CA

Mattole Watershed Taxpayers Assn., Garberville, CA

Mendocino Co. Cattle Assoc., Willits, CA

Mendocino Environment Center, Mendocino, CA

Mt. Shasta Resource Council, Mt. Shasta, CA

Natural Resources Defense Council, Inc., San Francisco, CA

The Nature Conservancy, Branscomb, CA

Northcoast Env. Center, Arcata, CA

Northwest Forest Workers Assoc., Calpella, CA

P. G. & E. Co., San Francisco, CA

Red Mountain Assoc., Leggett, CA

Redwood Chapter Sierra Club, Ukiah, CA

Round Valley News, Covelo, CA

The Sacramento Bee, Sacramento, CA

Salmon Trollers Mktg. Assoc., Mendocino, CA

Santa Rosa Jr. College, Agr. Forestry Dept., Santa Rosa, CA

Save the Redwoods League, San Francisco, CA

Self & Leggett, C.A.C., Leggett, CA

ORGANIZATIONS (Continued)

Shipley Associates Training Programs, Bountiful, UTAH

Sierra Pacific Ind., Arcata, CA

Southfork Mt. Study Croup, Hayford, CA

Stephens Building Materials, Whitethorn, CA

Times-Standard, Eureka, CA

University of California Coop. Ext., Eureka, CA

Upper Lake Rancheria, Upper Lake, CA

Western Timber Association, San Francisco, CA

The Wilderness Society, Davis, CA

Y Ranch, Carberville, CA

INDIVIDUALS

Heath Angelo, Branscomb, CA

Richard Burgess, Carberville, CA

Jack Burnam II, Novato, CA

Z. H. Calhoun, Jr., Los Altos, CA

Andrew E. Carlson, Eureka, CA

Tim Crlenjak, McKinleyville, CA

Alan K. Ebert, Piercy, CA

William Emerson, Laytonville, CA

C. E. Fisher and Robert C. McKee, Whitethorn, CA

J. A. Goslyn, Littleriver, CA

Ron Guenther, Fort Bragg, CA 95437

Marc Hansen, Talmage, CA

Dan Hou, Covelo, CA

Tom Jopson, Covelo, CA

Andy Johnston, Fort Bragg, CA

Lee A. Keeling, Tulsa, OKLA

Jim Lamport, Piercy, CA

Dave LaFave, Chico, CA

Mel Lynn, Whitethorn, CA

Donald F. MacKenzie, Talmage, CA

Antonio Mengual, Redway, CA

Bertil Munther, Eureka, CA

INDIVIDUALS (Continued)

Will and Liana Palmer, Piercy, CA

Vern Peckham, Covelo, CA

Harold Prior, Eureka, CA

Herb Roth, Leggett, CA

Bruce Ryan, Arcata, CA

Mary Shayne, Carberville, CA

Ruby Short, Covelo, CA

Mark Sommer, Miranda, CA

Cathy Studebaker, Redway, CA

Robert Sutherland, Whitethorn, CA

John E. Tredway, Leggett, CA

George W. Wiget, Lower Lake, CA

Forest Improvement Training Project, Eureka, CA

Mendocino Crapevine, Ukiah, CA

Alan R. Houser, Albany, CA

Ray Raphael, Whitethorn, CA

GLOSSARY

GLOSSARY

AC: Allowable cut.

ACRE-FOOT: The volume of water that will cover one acre to a depth of one foot (328,566 gallons).

ANADROMOUS FISH: Fish that migrate from the sea to breed in fresh water.

ANIMAL UNIT MONTH: The amount of forage needed to feed a mature cow, or its equivalent, for one month. Equals 300 pounds of total digestible nutrients or 3/10 ton of hay.

AUM: Animal unit month.

BASAL AREA: The area of the cross section at breast height of a tree or stand, usually expressed in square feet.

BEDLOAD: The sediment that moves by sliding, rolling, or bounding on or very near the streambed.

BLM: Bureau of Land Management.

BOARD FOOT: A unit of solid wood 1 foot square and 1 inch thick.

CEQ: Council on Environmental Quality.

CFR: Code of Federal Regulations.

CLEARCUTTING: A method of timber harvest in which all trees are cut from an area.

COMMERCIAL FOREST LAND: All forest land that is capable of yielding at least 20 cubic feet of wood per acre per year of commercial coniferous tree species. "Problem Sites" is a subclass of commercial forest land and includes (1) adverse location, (2) fragile areas, and (3) problem reforestation areas.

COMMERCIAL THINNING: Removal of surplus merchantable trees.

CULTURAL RESOURCES: The nonrenewable remains of human activity, occupation, or endeavor, reflected in districts, sites, structures, buildings, objects, artifacts, ruins, works of art, and architecture that were/are of importance in human events. These resources consist of (1) physical remains, (2) areas where significant human events occurred--even though evidence of the event no longer remains, and (3) the environment immediately surrounding the actual resource. Cultural resources, including prehistoric villages, hunting sites, petroglyphs, historic structures, mines, and trails all represent a part of the continuum of events from the earliest evidences of man to the present day (BLM Manual, Part 8100).

dBA: decibels measured on the A scale.

D.B.H.: diameter at breast height: 4-1/2 feet off the ground.

DRAINAGE AREA: A bottomland as yet lacking in channel development, but which flows substantial quantities of runoff water during spring runoff or after a storm of high rainfall intensity.

EIS: Environmental impact statement.

EPA: Environmental Protection Agency.

EPHEMERAL CHANNEL: Smaller stream channels with channel flow occurring only during spring runoff or after a storm of high rainfall intensity.

FLPMA: Federal Land Policy and Management Act.

FORMATION: 1. Something naturally formed, commonly differing conspicuously from adjacent objects or material, or being noteworthy for some other reason. 2. Stratig: The primary unit in lithostratigraphy consisting of a succession of strata useful for mapping or description. Most formations possess certain distinctive lithologic features that may indicate genetic relationships. Ordinarily the upper and lower boundaries of a formation are determined lithologically, but they may be unconformities or be determined by the occurrence of guide fossils. The age or time value of a formation is not necessarily the same wherever it is recognized. Formations may be combined in groups or subdivided into members.

GEOMORPHIC: Of or pertaining to the figure of the earth or the form of its surface; resembling the earth.

GEOLOGIC PROVINCE: Large region characterized by similar geologic history and development.

GROSS YARDING: Yarding unmerchantable residue to a landing.

HARD SNAG: A snag with sound heartwood.

INTERMITTENT STREAM: A stream that has sporatic surface flow. Channel springs provide limited base flow in short reaches only; the water sinks into stream gravels to emerge downstream as another channel spring and another short distance of surface flow.

LANDING: Any place on or adjacent to the logging site where logs are assembled for further transport.

LITHOLOGY: A term usually applied to sediments, referring to their general characteristics. It is used in several rather loose senses, i.e. 'lithological variation,' referring to variation in composition and texture; 'lithology of a formation,' meaning the rock types present in a stratigraphic subdivision. Lithology generally relates to descriptions based upon hand-specimens and outcrops rather than microscopic or chemical features.

MANAGEMENT FRAMEWORK PLAN: A planning decision document which establishes, for a given area of land, land use allocations, coordination guidelines for multiple use, and objectives to be achieved for each class of land use or protection. The Bureau's Land Use Plan.

MASS MOVEMENT: Downslope movement of soil and rock caused by gravity; may be slow (creep) or rapid (landslide, debris avalanche).

MELANGE UNIT: A melange unit generally consists of a highly sheared lustrous gray to black shale matrix containing abundant hard, resistant blocks of metagraywacke type sandstone, chert, greenstone, serpentinite, and metamorphic rock. Size of the blocks ranges from less than 1 foot (30 cm) to greater than 5 miles (8 km) in length. They make up a highly variable proportion of the entire unit.

MFP: Management framework plan.

NEPA: National Environmental Policy Act.

NONCOMMERCIAL FOREST LAND: Land that is not capable of yielding at least 20 cubic feet of wood per acre per year of commercial species, or land that is capable of producing only noncommercial tree species. Noncommercial species include all hardwoods, saleable or nonsaleable.

NRDC: Natural Resources Defense Council.

PERENNIAL STREAM: A stream that generally has year-long flow. Perennial baseflow is maintained throughout the year by channel springs.

PRECOMMERCIAL THINNING: Removal of surplus trees in a stand prior to their reaching merchantable size.

RIPARIAN: Pertaining to communities that develop on or near the banks of a body of water.

ROADLESS: The absence of roads that have been improved and maintained by mechanical means to ensure relatively regular and continuous use. A way maintained solely by the passage of vehicles does not constitute a road.

SEDIMENT YIELD: The quantity of sediment, measured in dry weight or volume, transported through a stream cross section in a given time. Consists of both suspended sediment and bedload.

SEED PRODUCTION AREA: A plus (better than average) stand that is upgraded by periodic removal of undesirables and cultured for early and abundant seed production; may be a natural stand.

SET: Sensitive, endangered, threatened.

SHELTERWOOD CUTTING: A series of partial cuttings designed to establish a new crop of trees under the protection of the old.

SIMIX: Simulating intensively-managed forest properties utilizing a mixed harvest management system. SIMIX is a forest management simulation model. Basically, SIMIX is a variation of the SIMAC model with minor changes. A detailed discussion of the SIMAC model is contained in US Forest Service Technical Report PNW-1.

SITE INDEX: An expression of site quality based on average tree height of dominants and codominants at 100 years of age.

SNAG: A standing dead tree of sufficient size to afford cavity-nesting habitat; at least 10 inches d.b.h. and 12 feet tall.

SOCIOCULTURAL RESOURCES: Places, objects, structures, and things of importance to a subgroup or the population at large. Included are values that reflect the concepts, religions, social heritage, habits, skills, arts, and lifestyles of a given people. Sociocultural resources may include spiritual rocks, rivers, mountains, traditional basket material collecting sites and hunting grounds (BLM Manual, Part 8100).

SOFT SNAG: A snag in a more advanced stage of decay than a hard snag and few intact branches.

SOIL MAPPING UNIT: A kind of soil, a combination of kinds of soils, or miscellaneous land type or types that can be shown at the scale of mapping for the defined purposes of the survey; the basis for the delineations of a soil survey map.

SUSPENDED SEDIMENT: Sediment suspended in a fluid by the upward components of turbulent currents or by colloidal suspension.

SYU: Sustained yield unit.

TIMBER PRODUCTION BASE: The timber production base is land dedicated wholly or partially (as determined by the land-use planning process) to timber production on a sustained-yield basis and on which an allowable cut is calculated.

TIMBER PRODUCTION CAPABILITY CLASSIFICATION: The process of partitioning land within the forest boundary into major classes indicating relative suitability to produce timber on a sustained yield basis. Delineation of the forest land base.

TIMBER STAND IMPROVEMENT: A general term for a combination of activities such as precommercial thinning and brush control.

TPCC: Timber production capability classification.

TSI: Timber stand improvement.

VRM: Visual Resource Management.

WILDERNESS: As defined in Section 2c of the Wilderness Act of 1964: A wilderness, in contrast with those areas where man and his own works dominate the landscape is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

WM: Work-month.

WSA: Wilderness study area.

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APPENDIX

A

APPENDIX 2-1

SYU 13 SCOPING PROCESS

(1979)

April 20	- Internal prescoping session with managers, resource specialists, and the EIS staff regarding alternative development, identification of central issues, and identification of the concerned persons/groups to be consulted during the scoping process.
May 7	- Second prescoping session with managers, resource specialists, and the EIS staff regarding alternative development and identification of the concerned persons/groups to be consulted during the scoping process.
July 2	- Notice of intent to prepare an environmental impact statement and notification of the scoping process published in the Federal Register.
August 3	- Scoping letters mailed to affected Federal, State, and local agencies and other interested persons summarizing prescoping session results and soliciting either a workshop meeting or a narrative reply.
August 8-12	- Followup phone calls to confirm dates of workshop scoping sessions.
August 13-31	- Eleven separate workshop sessions throughout the North Coast region with Federal, State, and local agencies, private industry, and environmental and interest groups.
September 13	- Public meeting - Eureka, California (scoping session held concurrent with MFP 1 public meeting).
September 22	- Public meeting - Ukiah, California (scoping session held concurrent with MFP 1 public meeting).
September 27	- Final scoping request letter summarizing the results of previous scoping efforts.

APPENDIX 2-2

10-YEAR TIMBER MANAGEMENT PLAN MODEL
(PROPOSED TIMBER SALES AND REHABILITATION*)

SALE YR/NO.	SALE VOLUME (MMBF)	VOLUME (MMBF) CAT	VOLUME (MMBF) CABLE	ACREAGE CAT	ACREAGE CABLE	ROADS MILES CONSTRUCTION	ROADS MILES RECONSTRUCTION	TYPE OF REHABILITATION ON SALE AREA	REHAB. ACREAGE	PERENNIAL STREAM CROSSINGS	SLASH DISPOSAL ACRES	SLASH DISPOSAL WEIGHT (TONS)
82-1	1.8	1.8	0	70	0	0.66	2.55					
82-2	2.0	.209	1.8	7	62	0.85	0					
82-3	2.0	1.55	.455	88	26	3	0					
83-1	2.0	1.203	0.797	79	55	0.98	3.26	Precommercial Thinning Seed Production Area	12 10			
83-2	4.7	3.50	1.28	97	36	1.96	0.27					
83-3	6.25	4.41	1.84	156	49	3.55	11.2				49	1078
84-1	2.0	1.07	0.93	179	158	0.87	6.27	Mechanical crushing scarification - Precommercial thinning-Timber Stand Improvement	50 17 287		297	5940
84-2	1.6	0	1.6	0	46	1.57	0			1		
84-3	3.15	.140	3.01	4	86	1.82	0					
84-4	1.5	1.5	0	40	0	0	0.63	Precommercial Thinning	40			
85-1	4.0	3.35	0.65	118	23	2.39	0					
85-2	4.0	.497	3.5	19	112	1.67	15.67			1		
85-3	3.0	.506	2.49	14	69	1.0	2.2			1		
85-4	2.5	.53	1.97	4	180	1.61	5.78				228	2284
86-1	1.0	.310	.69	19	34	0.72	4.03	Hardwood Conversion	5		53	2915
86-2	4.0	0	4.0	0	147	1.33	6.4				147	2500
86-3	3.0	0	3.0	0	121	0.9	0				66	5280
86-4	2.87	1.63	1.24	130	100	2.27	1.52	Hardwood Conversion	28	1	28	560
87-1	2.0	0.24	1.76	24	52	3.17	1.74	Precommercial Thinning Timber Stand Improvement	2 24		24	1616
87-2	4.91	4.08	.85	137	29	8.82	2.13	Hardwood Conversion	76			
87-3	2.75	2.48	.270	83	9	0.57	0					
88-1	4.0	3.0	1.0	101	28	1.75	7.84					
88-2	4.0	.786	3.21	33	135	2.45	4.8			1		
89-1	3.7	.338	3.362	41	190	3.31	4.8			1		
89-2	3.6	0	3.6	0	151	1.66	2				231	4000
89-3	1.9	.103	1.82	4	65	1.24	0.83			1		
90-1	6.58	0	6.58	0	188	1.02	4.9					
90-2	2.2	0	2.2	0	78	1.42	0				78	1300
91-1	2.0	0	2.0	0	156	0	0	Precommercial Thinning	156			
91-2	1.0	1.0	0	70	0	0	3.22	Precommercial Thinning	70			
91-3	2.0	1.4	.600	92	36	0	2.23	Precommercial Thinning	128			
91-4	4.6	0.73	4.49	4	186	3.96	0.21	Hardwood Conversion	153		11	220
TOTAL	96.61 **	36.362	60.994**	1613	2607	56.52	94.48		1058	7	1212	27,693

* Rehabilitation proposed would be done in conjunction with the timber sales.

** Differences due to Rounding 97MM.

APPENDIX 2-2

*REHABILITATION PLAN FOR THE 10-YEAR TMP MODEL

Page 2 of 2

Rehabilitation Year-Number	Type	Acreage
83-1	Hardwood control - Precommercial Thinning Grass Control/interplanting w/animal control	11 135
84-1	Hardwood conversion	117
84-2	Precommercial Thinning	18
85-1	Hardwood sale Hardwood conversion	27 27
87-1	Precommercial Thinning & hardwood conversion	16
88-1	Fertilization	35
88-2	Fertilization	40
TOTAL		426

*This proposed plan for rehabilitation is a part of the 10-year Timber Management Plan Model, however, these projects are discrete actions apart from the proposed timber sales.

APPENDIX 2-3

SITE PREPARATION AND RELEASE SPECIFICATIONS

FOR CHEMICAL TREATMENT - UKIAH DISTRICT

SYU 13 TIMBER MANAGEMENT PLAN

APPLICATION - GENERAL

Chemicals containing TCDD (dioxins) and/or highly volatile formations (such as butyl esters) and chemicals toxic to fish and other aquatic organisms (such as butoxy ethanol) will not be used.

Aerial applications (helicopter or airplane) will not be used. Applications will be by such methods as: (1) truck-mounted spraying units; (2) backpack pumps or pressurized tanks; or (3) tree injections, such as with the "Hypo-Hatchet."

Specifications

1. There will be no spraying when wind velocity exceeds 8 miles per hour.

2. There will be no spraying when air temperature exceeds 80 degrees Fahrenheit and relative humidity is less than 50 percent.

3. There will be no spraying within 200 feet of a dwelling or cultivated crop.

4. There will be no spraying within any buffer zone prescribed by the management plan and no spraying within 50 feet of designated waterways.

5. There will be no spraying within any identified rare or endangered species area.

6. Spray tanks and chemical containers will not be washed-out in or near any streams.

7. Chemical containers will not be disposed of in the treatment area.

8. Chemical mixing will be so located that accidental spills will not enter existing streams or bodies of water.

9. All chemical mixing, loading, hauling, and applications equipment will be free from leaks and will operate as designed.

10. The intake operation of water for mixing will be so arranged that an air gap or reservoir will be placed between the live water intake and the mixing tank to prevent any backflow of chemical into the water source.

11. Herbicide emulsions or solutions will be premixed in the presence of the certified applicator prior to filling the chemical tanks.

12. Each container will be rinsed three times with the same substance (oil or water) used to dilute the technical formulations. Each rinsing will be placed in a spray tank for application on target species. No washing or rinsing of equipment or containers and no dumping of chemicals or disposal of containers will be permitted on the project area or other lands administered by the Bureau of Land Management except as indicated in the management plan for the specific project. Upon completion of the work, all unused materials and all containers will be immediately removed from the area.

13. After rinsing, metal containers will be taken to an authorized dump site for disposal by the dump operator. Paper containers will be completely burned at a site identified by the project management plan or taken to an authorized dump site for disposal by the dump operator.

14. Water samples will be taken before, during, and at designated intervals following treatment operations. Samples will be tested by an approved laboratory for presence and quantity, if any, of chemicals used.

15. All chemical treatment operations will be under the direct supervision of a certified herbicide applicator.

Planning

All areas scheduled for chemical application for the purpose of site preparation or release will have a treatment plan prepared for each project. The plan will:

1. Comply with the Environmental Protection Agency (EPA) labels for the chemical(s) used.

2. Comply with the specifications listed above.

3. Comply with current EPA and State of California, Department of Food and Agriculture rules and regulations.

Operations

Treatment operations will be conducted in strict compliance with the prescribed plan for the project(s).

APPENDIX 3-1

Major Soils of SYU 13 and Their Properties and Interpretations

MAP SYMBOL	NAME	% OF MAP UNIT *	POSITION ON LANDFORM	PARENT MATERIAL	TEXTURE Surface / Subsoil (1)	DOMINANT SLOPE RANGE %	ASPECT (2)	DEPTH (inches)	PERME-ABILITY (3)	EROSION HAZARD	COMPAC-TION HAZARD	MAJOR LIMITATIONS
1 **	Casabonne	45	ridges & mt. slopes	weathered sandstone	l / cl	30-75	N	50	MS	M	M	
	Maymen	20	mt. slopes	fractured sandstone	sal / sal	30-75	S	11	M	M	L	Depth
**	Wholey	15	mt. slopes	fractured schist	gl / gcl	30-75	S	31	MS	H	L	
2	Sheet-iron	25	mt. slopes	schist and sandstone	vgl / vgl	30-70	N	25	M	H	L	
	Plaskett	20	mt. slopes	fractured sandstone	l / gl	30-70	N	10	M	H	L	Depth
**	Madonna	20	mt. slopes	fractured sandstone	l / l	30-70	S	25	M	M	M	
3	Hopland	30	steep canyon side slopes	fractured sandstone	l / cl	30-75	N	31	MS	M		Slope
	Yorkville	25	steep rolling hills		cl / c	15-50	S	60+	VS	H		Landslide
	Yorktree	20	steep rolling hills	fractured graywacke	l / cl	30-50	N	51	VS	M		Landslide - permeability
4	Maymen	40	steep hill slopes	fractured sandstone	sal / sal	30-75	S & W	11	M	H	L	
	Squawrock	20	steep hill slopes-colluvial toe slopes	fractured sandstone	l / l	30-75	N	21	M	M	L	Very Cobbly
	Hopland	20	steep hill slopes	fractured sandstone	l / cl	30-75	N	31	MS	M	M	
5	Cole	30	alluvial plains		l / cl	0-8		60+	MS	L	M	Drainage
	Russian	30	alluvial plains		l / sal	0-8		60+	M	L	M	
	Pinole	15	alluvial terraces		l / gcl	0-8		60+	MS	L	M	
6 **	Hugo	40	uplands - narrow ridges	fractured sandstone	l / cl	30-75	N	48	MR	H	M	
**	Josephine	30	uplands	fractured sandstone	gl / cl	30-60	N	48	MS	H	M	
7	Yorkville	75	steep rolling hills		cl / c	15-50	S	60+	S	H		Landslide
8	Larabee	75	hilly to very steep	soft sedimentary rocks	l / cl		N	50	M	M		
9	Ferndale	25	stream terraces		sil / sil	0-3		80+	M	L	M	
	Bayside	25	alluvial basin		sicl / c	0-3		36	S	L	H	Drainage
	Hookton	25	dissected slopes		sicl / sicl	3-8		36	S	M	H	Compaction
10	Colluvial Land	70	very steep side slopes		l / l	45-100		24	M	H	M	Slope

* The remaining percentage is minor soils
** Forest soils

KEY

(1) c = clay, l = loam, sa = sandy, g = gravelly, si = silty, v = very

(2) n = north, s = south

(3) h = high, m = moderate, l = low, s = slow, r = rapid, v = very

APPENDIX 3-2

GENERAL LOCATIONS OF WILDLIFE HABITAT INVENTORIES
HUMBOLDT, TRINITY, AND MENDOCINO COUNTIES
MAY - SEPTEMBER 1978

1 cm = 21 km
1 inch = 22.5 miles

■ Approximate location of study area (a total of 77 specific sites were inventoried)

APPENDIX 3-3
SELECTED AND REPRESENTATIVE ANIMALS SUBJECT TO IMPACT
KEY

Vegetation Zones

me - Mixed evergreen

crm - Coast Range Montane Forest

r-d - Redwood-coastal Douglas-fir

r - Riparian (area adjacent to water)

a - All

Significance Criteria

1. Threatened, endangered, sensitive or special status.
2. Species of limited range.
3. Species of limited adaptability.
4. Game or harvest species.
5. Old-growth mature forest dependent species.
6. Provides special habitat for other species.
7. Important prey species (e.g., goshawk, peregrine falcon, spotted owl).

Habitat Requirements (Components) Subject to Impact

1. Use of friable soil for burrows.
2. Primary cavity nesters (snags).
3. Secondary cavity nesters (snags).
4. Natural cavity nesters (snags and natural cavities).
5. Use of ground litter and down logs for reproduction, feeding.
6. Brushes and low trees for reproduction, feeding.
7. Mature deciduous trees for reproduction, feeding, roosting.
8. Mature coniferous trees for reproduction, feeding, roosting.
9. High canopy cover.
10. Cold perennial stream, high dissolved O_2, low silt load.
11. High soil moisture, moderate temperatures.
12. Quiet, cool water.
13. Riparian habitat for reproduction, feeding, cover.
14. Open or semi-open forest stand.
15. Forest openings.
16. Wet meadows - seeps - springs.

Relative Abundance (From USFS 1979a)

A - Abundant

C - Common

U - Uncommon

R - Rare

- - Status undetermined.

Habitat Quality (Present)

P - Poor (Habitat quality so reduced as to question suitability over most of the SYU).

F - Fair (Habitat quality reduced in portions of the area).

G - Good (Present habitat condition capable of maintaining resident populations over most of the SYU).

- - Unknown

Habitat Use

F - Feeding

R - Reproduction

Habitat Trend

I - Increasing

S - Stable

D - Decreasing

* - Species known to occur. Presence confirmed by wildlife surveys on BLM timber lands, 1978 - 1979. Other species are expected to occur due to their known range and habitat suitability.

	Vegetation Zones	Criteria of Significance	Habitat Requirements Subject to Impact	Grass/Forb (not highly developed with shelterwood system)	Brush/Seedling 0-14	Pole/Sapling 15-39	Young Forest 40-99	Mature Forest 100-199	Old Forest 200+	Relative Abundance	Habitat Quality	Habitat Trend
AMPHIBIANS												
Tailed Frog	crm, r-d, r	2, 3	9, 10, 13				FR	FR	FR	U	F	D
Red-legged Frog	crm, r-d, r	1	11, 12, 13	F	FR	FR	FR	FR	FR	U	G	S
Western Red-bellied Newt *	r-d, r	2	5, 10, 11, 13			FR	FR	FR	FR	U	F	S
Olympic Salamander	r-d, r	3	5, 9, 10, 11					FR	FR	U	F	D
Pacific Giant Salamander *	a	3	5, 9, 10, 11, 13				F	FR	FR	C	F	D
Ensatina	a	3	5, 8, 9, 11				FR	FR	FR		G	D
Arboreal Salamander	me, r-d, r	3	4, 5, 6, 11	F	FR	FR	FR	FR	FR		G	D
Black Salamander *	me, r-d, r	3	5, 9, 11, 13		F	F	FR	FR	FR		G	D
REPTILES												
Northern Alligator Lizard *	a	3	5, 11	F	F	FR	FR	FR	FR	C	G	S
Rubber Boa *	a	3	1, 5, 11, 16		F	F	FR	FR	FR		F	D
Sharp-tailed Snake*	a	3	1, 5, 11	F	F	F	FR	FR	FR	C	G	S
Ringneck Snake	a	3	1, 5, 11		F	F	FR	FR	FR		G	D
Calif. Mountain Kingsnake	me, r	1, 3	1, 5, 11, 13	FR	FR	FR	FR	FR	FR		F	D
BIRDS												
Goshawk *	a	5	5, 8, 9, 13	F	F		F	FR	FR	R	F	D
Cooper's Hawk *	a, r	3	5, 7, 13, 15	F	F	F	FR	FR	F	U	G	S
Golden Eagle *	a	1	8	F	F			R	FR	U	G	S
Bald Eagle *	a, r	1, 3	8, 13	F	F	F	F	FR	FR	R	F	D
Osprey *	a, r	1, 3	8, 13	F	F	F	F	FR	FR	U	F	D
Peregrine Falcon *	a, r	1	13	FR	FR	FR	FR	FR	FR	R	G	S
Blue Grouse *	a	4	5, 7, 8, 13, 15	F	FR	FR	F	F	F	C-U	G	S
California Quail *	a, r	4, 7	5, 6, 13, 15,16	F	FR	FR	FR			C	G	F
Mountain Quail *	a, r	4	5, 6, 13, 15, 16	F	FR	FR	FR	F	F	C-U	G	D
Band-tailed Pigeon *	me	4, 7	7, 8, 13, 16	F	F	F	F	FR	FR	C	G	D
Mourning Dove *	a	4	6, 13, 14, 16	FR	FR	FR				C-U	G	F
Flammulated Owl	me, r-d	2, 3	3, 6, 7, 14			F	FR	FR		R	G	D
Pygmy Owl *	a	3	3, 14, 15, 16		F	F	FR	FR	FR	C-U	G	D

	Vegetation Zones	Criteria of Significance	Habitat Components Subject to Impact	Grass/Forb	Brush/Seedling	Pole/Sapling	Young Forest	Mature Forest	Old Forest	Relative Abundance	Habitat Quality	Habitat Trend
BIRDS (Cont'd)												
Northern Spotted Owl *	a	1, 2, 3, 5	4, 8, 9, 13				F	FR	FR	R-U	F	D
Saw-whet Owl *	a	3	3, 15, 16		F	F	FR	FR	FR	U	G	D
Vaux's Swift *	me, r-d	5	4, 15, 16	F	F	F	F	FR	FR	C-U	F	D
Common Flicker *	a	6, 7	2, 7, 8, 13, 14	F	F	F	FR	FR	FR	C	G	D
Pileated Woodpecker *	a	5, 6	2, 5, 7, 8, 13, 16				F	FR	FR	C	F	D
Acorn Woodpecker *	me, crm	3, 6, 7	2, 5, 7, 8, 13			F	FR	FR	FR	C-U	F	D
Lewis Woodpecker	crm, r	3, 6	2, 5, 7, 8, 13.14	F	F		FR	FR	FR	U	F	D
Yellow-bellied Sapsucker *	a	3, 6	2, 5, 7, 8, 14		F	F	FR	FR	FR	C	G	D
Hairy Woodpecker *	a	3, 6	2, 5, 6, 8, 14			F	FR	FR	FR	C-U	F	D
Downy Woodpecker *	a, r	3, 6	2, 5, 7, 13		F		FR	FR	FR	C-U	F	D
White-headed Woodpecker *	crm	2, 3, 6	2, 8, 14					FR	FR	R-U	F	D
Hammond's Flycatcher	crm	5	8				FR	FR	FR	R-U	--	D
Violet-green Swallow *	a	3, 7	3, 4, 14, 15, 16	F	F	F	FR	FR	FR	C-U	G	D
Tree Swallow *	a	3	3, 4, 13, 15, 16	F	FR	FR	FR	FR	FR	C-U	G	S
Purple Martin	a	3	3, 4, 6, 8, 13, 14, 16	F	FR	FR	F	F	F	U	G	D
Steller's Jay*	a	7	5, 6, 7, 8		C	FR	FR	FR	FR	C	G	S
Mountain Chickadee *	a	3	3, 4, 5, 8		F	F	FR	FR	FR	U	G	D
Chestnut-backed Chickadee *	a	3, 6	2, 3, 5, 7, 8, 13			F	FR	FR	FR	C	G	D
White-breasted Nuthatch *	a, r	3, 6	2, 3, 4, 5, 7, 8				F	FR	FR	U	F	D
Red-breasted Nuthatch *	a	3, 6	2, 3, 4, 5, 8				FR	FR	FR	C	G	D
Brown Creeper *	a	3	4, 5, 8, 9				F	FR	FR	C	G	D
American Robin *	a	7	7, 13, 16	F	FR	FR	FR	FR	FR	C	G	S
Varied Thrush	r-d	3	5, 6, 7, 8, 9		F	F	F	FR	FR	C-U	G	D
Western Bluebird *	a	3	3, 4, 5, 6, 7, 14, 15	F	C	F	FR	FR	FR	C-U	F	D
Hermit Warbler *	a	3	7, 8, 9				FR	FR	FR	C	F	D

	Vegetation Zones	Criteria of Significance	Habitat Requirements Subject to Impact	Grass/Forb	Brush/Seedling	Pole/Sapling	Young Forest	Mature Forest	Old Forest	Relative Abundance	Habitat Quality	Habitat Trend
MAMMALS												
Marsh Shrew	me, r-d, r	2, 5	5, 9, 11, 13, 16					FR	FR		F	D
Shrew Mole *	a	5	1, 4, 5, 7, 8,9,11,13					FR	FR		F	D
Long-legged Myotis	a	3	4, 6, 8, 9, 13, 15	F	F	F	F	FR	FR		S	D
Silver-haired Bat	a	3	4, 6, 7, 8	F	F			FR	FR		F	D
Black Bear *	a	4	1, 5, 6, 8, 13, 16	F	F	F	FR	FR	FR	C-U	G	S
Raccoon *	a, r	4	4, 5, 12, 13, 16		F	FR	FR	FR	FR	C	G	S
Ringtail	a, r	1	4, 5, 6, 13, 14	F	FR	FR	FR	FR	FR		G	S
Pine Marten	crm	2	4, 5, 8, 9, 13		F	F	FR	FR	FR	R	P	D
Fisher	crm	2	5, 8, 9, 13			F	F	FR	FR	R	P	D
Mink *	a, r	4	1, 5, 13	FR	FR	FR	FR	FR	FR	C-U	F	S
River Otter *	a, r	1	5, 13	FR	FR	FR	FR	FR	FR	U	F	S
Coyote *	a	4	1, 6, 13, 15	FR	FR	FR	FR	FR	FR	C	G	I
Grey Fox *	a	4	4, 5, 6, 7, 13	F	FR	FR	FR	FR	FR	C	G	S
Mountain Lion *	a	1	6, 13, 14, 15, 16	F	FR	FR	FR	FR	FR	U	F	S
Bobcat *	a	4	4, 5, 13, 14, 15	F	FR	FR	FR	FR	FR	C-U	G	S
Mountain Beaver	crm, r-d, r	2	1, 7, 11, 13, 15,16	FR	FR	FR	FR	FR	FR	U	G	S
Western Grey Squirrel *	a	4	3, 4, 5, 7, 8, 13			F	FR	FR	FR	C	G	S
Douglas Squirrel *	a	7	3, 4, 5, 8, 9				FR	FR	FR	C	G	D
Northern Flying Squirrel *	a	3, 5, 7	3, 4, 5, 8, 9, 13					FR	FR		F	D
Deer Mouse *	a	7	1, 5, 6, 13, 14	FR	FR	FR	FR	FR	FR	A	G	I
Dusky-footed Woodrat *	a	7	5, 6, 14	FR	FR	FR	FR	FR		C	G	I
Bushy-tailed Woodrat *	a	7	5, 13, 14	F	FR	FR	FR	FR	FR		G	S
Red Tree Mouse *	me, r-d	3, 5, 7	5, 8, 9					FR	FR	R	F	D
Western Red-backed Vole *	a	3, 5, 7	1, 5, 8, 9, 13					FR	FR		G	D
Brush Rabbit *	a	4, 7	1, 6, 13, 16	FR	FR	FR				C	G	I
Black-tailed Deer *	a	4	6, 7, 13, 14,15,16	FR	FR	FR	FR	FR	FR	C	G	S

APPENDIX 3-4

FISHES OF THE EEL RIVER BASIN

Common	Scientific	Relative Abundance In the Eel River
	Anadromous Species	
Pacific lamprey	Entosphenus tridentatis	Abundant
River lamprey	Lampetra ayresi	Uncommon
Green sturgeon	Acipenser medirostris	Common
American shad	Alosa sapidissima	Abundant
Silver salmon	Oncorhyncus kisutch	Abundant
King salmon	Oncorhyncus tshawytscha	Abundant
Coast cutthroat trout	Salmo clarki	Uncommon
Steelhead rainbow trout	Salmo gairdneri	Abundant
	Freshwater Species	
Rainbow trout	Salmo gairdneri	Abundant
Humboldt sucker	Catostomus occidentalis	Abundant
Golden shiner	Notemigonus crysoleucus	*
Western roach	Hesperoleucus symmetricus	Abundant
Brown bullhead	Ictalurus nebulosus	Common
Green sunfish	Lepomis cyanellus	Common
Bluegill	Lepomis macrochirus	Uncommon
Prickly sculpin	Cottus asper	Abundant
Aleutian sculpin	Cottus aleuticus	Abundant
Three-spined stickleback	Gasterosteus aculeatus	Abundant

* Common in Lake Pillsbury, but rare elsewhere

Source: Brown and Haley 1974

APPENDIX 3-5

CLASS III - INTENSIVE FIELD INVENTORY

Site Number	Site Type	Description	Comments	Township	Range	Area
HM #1	Task Specific	Site consists of scattered lithics and one acorn anvil. It is not known whether subsurface materials are present.	Severe disturbance due to previous logging activities e.g., cut tracts, landings, and yarding alleys.	7 N	3 E	Not determined
BC #1	Multi-activity	The site is characterized as midden site (subsurface deposit) including lithics and groundstone.	An existing access road cuts through the site.	4 N	4 E	2000 M^2
PR #1	Multi-activity/ Historic	The immediate site area consists of an extensive lithic scatter (all chert), several flaked stone items, some groundstone and recent historic debris e.g., stove parts, logging cable, cans, etc. Subsurface materials may be present.	The area around the site exhibits disturbance due to past logging activities.	3 N	5E	9600 M^2
MR #1	Task Specific	The site is charscterized as a large lithic scatter including a variety of tools. Subsurface materials may be present	Grazing activities have impacted the site to a limited extent.	2 N	5 E	2500 M^2
MR #2	Task Specific	The site consists of a light lithic scatter (chert flakes). Subsurface materials are present to at least 20 to 30 CM.	The site has been disturbed by past logging activites.	2 N	5 E	100 M^2
RM #1	Task Specific	The site consists of scattered lithics. There was no evidence of subsurface materials.	The site has been disturbed by past logging activities.	24 N	16 W	10 M^2
RM #2	Task Specific/ Historic	The site is characterized as a lithic scatter. The site also included historic material; including the remains of a wooden structure, porcelain fragments, and several metal objects. No apparent depth.	The area appears to have been subjected to earth movement by heavy machinery.	24 N	16 W	1800 M^2
RM #3	Task Specific	The site consists of scattered lithics including several artifacts. Subsurface materials may be present.	An old access road cuts through the middle of the site running in a northwest to southeast direction.	24 N	16 W	Ca. 150 M^2
RM #4	Task Specific	The site is characterized as a light lithic scatter including one projectile point fragment. No apparent depth.	The site exhibits surface disturbance i.e., cat tracks, burned areas, slash.	24 N	16 W	Not determined
TR #1	Multi-sctivity	Extensive subsurface deposit consisting of lithics and groundstone.	The area has been subjected to some surface disturbance.	5 S	8 E	Not determined
TR #2	Historic	Old history structure that may be related to early ranching activities.	The site area has been disturbed by past logging activities.	5 S	8 E	100 M^2

Archaelogical sites have only been assigned township and range locations to prevent vandalism as a result of this information being disclosed in this public document.

(Levulett and Ruhstaller 1980)

APPENDIX 3-6

DEPOSITORIES FOR CULTURAL REPORTS AND AGENCIES CONTACTED

DEPOSITORIES FOR CULTURAL REPORTS

The Class I - Prehistoric and Ethnographic Overview (Tamez 1978) and the Class I - Historic Overview (Herbert, Patterson, and Wee 1979) are on file (without preciae site location) with the following museums, universities, and libraries:

Mendocino County Museum

Clark Museum

Library, Humboldt State University

Library, University of California, Davis

Library, Humboldt County

Northwest Indian Cemetery Protective Association

Library, Sonoma State University

Library, College of the Redwoods

Library, Mendocino County

Library, Mendocino Community College

AGENCIES CONTACTED

FEDERAL:

Heritage Conservation and Recreation Service
Pacific Southwest Region
450 Golden Gate Avenue
Box 36062
San Francisco, California 94102

Office of Review and Compliance
President's Advisory Council on Historic Preservation
P. O. Box 25085
Denver, Colorado 80225

STATE:

Native American Heritage Commission
1400 Tenth Street
Sacramento, California 95814

Cultural Resource Facility
Anthropological Studies Center
Sonoma State University
1801 East Cotati Avenue
Rohnert Park, California 94928

Department of History
University of California, Davis
Davis, California 95616

State Historic Preservation Officer
Office of Historic Preservation
Department of Parks and Recreation
P. O. Box 2390
Sacramento, California 95811

Department of Anthropology
University of California, Davis
Davis, California 95616

LOCAL:

Mendocino County Archaeological Commission
County Courthouse
Ukiah, California 95482

Northwest Indian Cemetery Protective
Association, Inc.
P. O. Box 2668
McKinleyville, California 95521

Mendocino County Museum
400 E. Commercial
Willits, California 95490

Clark Museum
3rd Street
Eureka, California 95501

Other organizations, interested groups and individuals contacted are listed in the cultural resource management reports.

The Native American tribal organization and individuals contacted are listed in the report prepared by the Northwest Indian Cemetery Protective Association.

APPENDIX 3-7

VISUAL RESOURCE MANAGEMENT CLASSES AND GUIDELINES

Class I. This class provides primarily for natural ecological changes; however, it does not preclude very limited management activity. Any contrast created within the characteristic environment must not attract attention. It is applied to wilderness areas, some natural areas, wild portions of the wild and scenic rivers, and other similar situations where management activities are to be restricted.

Class II. Changes in any of the basic elements (form, line, color, texture) caused by a management activity should not be evident in the characteristic landscape. A contrast may be seen but should not attract attention.

Class III. Contrasts to the basic elements (form, line, color, texture) caused by a management activity may be evident and begin to attract attention in the characteristic landscape. However, the changes should remain subordinate to the existing characteristic landscape.

Class IV. Contrasts may attract attention and be a dominant feature of the landscape in terms of scale; however, the change should repeat the basic elements (form, line, color, texture) inherent in the characteristic landscape.

Class V. Change is needed or change may add acceptable visual variety to an area. This class applies to areas where the naturalistic character has been disturbed to a point where rehabilitation is needed to bring it back into character with the surrounding landscape. This class would apply to areas identified in the scenic evaluation where the quality class has been reduced because of unacceptable cultural modification. The contrast is inharmonious with the characteristic landscape. It may also be applied to areas that have the potential for enhancement, i.e., add acceptable visual variety to an area/site. It should be considered an interim or short-term classification until one of the other VRM class objectives can be reached through rehabilitation or enhancement. The desired visual resource management class should be indentified.

APPENDIX 3-8

WAGE AND SALARY EMPLOYMENT[a]

Humboldt County

Annual Averages

	1972	1973	1974	1975	1976	1977	1978
Total, all industries	33,325	34,625	35,550	35,925	37,975	38,725	39,725
Agricultural wage and salary	625	625	675	600	600	675	675
Agricultural production	425	400	450	400	400	425	450
Agricultural services, forestry & fisheries	200	225	225	200	200	250	225
Nonagricultural wage and salary	32,700	34,000	34,875	35,325	37,375	38,050	39,050
Construction and mining	950	1,000	1,125	1,350	1,125	1,175	1,325
Manufacturing	9,525	9,550	8,950	8,250	8,775	8,700	7,925
Food processing	650	550	575	625	800	775	775
Lumber and wood products	7,925	7,975	7,300	6,525	6,925	6,825	6,125
Other manufacturing	950	1,025	1,075	1,100	1,050	1,100	1,025
Transportation and public utilities	2,025	2,150	2,175	2,100	2,325	2,400	2,200
Wholesale trade	1,175	1,300	1,325	1,225	1,275	1,375	1,425
Retail trade	5,150	5,450	5,575	5,650	6,075	6,450	7,100
Finance, insurance, and real estate	900	925	1,000	1,050	1,100	1,225	1,300
Services	4,475	5,050	5,450	5,975	6,775	7,150	7,675
Government[b]	8,500	8,575	9,275	9,725	9,925	9,575	10,100
Federal	625	675	700	725	725	725	750
State	975	950	925	950	950	925	975
Local and education[c]	6,900	6,950	7,650	8,050	8,250	7,925	8,375

[a] Employment reported by place of work. Does not include the self-employed, volunteer or unpaid family workers, private household workers, and persons involved in labor-management trade disputes.

[b] Includes all civilian employees of federal, State, and local governments, regardless of the activity in which the employee is engaged.

[c] Local government includes employees of counties, cities, and special districts. Education includes employees of public schools at both the State and local levels.

APPENDIX 3-8

WAGE AND SALARY EMPLOYMENT[a]

Mendocino County

Annual Average

	1972	1973	1974	1975	1976	1977	1978
Total, all industries	16,125	16,675	17,475	17,950	19,600	21,100	22,250
Agricultural wage & salary workers, agric. serv., forestry and fisheries[b]	975	1,225	1,250	1,275	1,250	1,250	1,275
Nonagricultural wage and salary workers	15,150	15,450	16,225	16,675	18,350	19,850	20,975
Construction and mining[c]	450	525	500	450	500	600	850
Manufacturing	4,850	4,800	4,850	4,400	5,175	5,500	5,400
Lumber and wood products	3,650	3,550	3,500	3,125	3,675	3,750	3,675
Other manufacturing	1,200	1,250	1,350	1,275	1,500	1,750	1,725
Transportation and public utilities	925	925	875	875	950	1,000	1,000
Wholesale trade	400	450	450	475	550	625	675
Retail trade	2,525	2,700	2,800	2,900	3,175	3,700	4,125
Finance, insurance, and real estate	425	450	500	525	550	600	650
Services[d]	2,225	2,425	2,600	2,925	3,275	3,625	3,925
Government[e]	3,350	3,175	3,650	4,125	4,175	4,200	4,350
Federal	275	325	350	375	450	400	450
State	750	425	425	450	450	450	450
Local and education[f]	2,325	2,425	2,875	3,300	3,275	3,350	3,450

a/ Wage and salary employment is reported by place of work rather than place of residence. It does not include self-employed persons, volunteer workers, unpaid family workers, private household workers, or persons involved in labor-management trade disputes.

b/ Does not include farmers and unpaid family workers. The definition of agricultural services has been changed to exclude veterinary services, other animal services, and landscaping and horticultural services (SIC 074, 075, 078). These are now included in services.

c/ Construction employment includes employees of construction contractors and operative builders. Does not include force-account or government construction workers.

d/ Services employment includes veterinary services, other animal services, and landscaping and horticultural services (SIC 074, 075, 078). Previously these had been included in agricultural employment.

e/ Government employment includes all civilian employees of federal, State, and local government, regardless of the activity in which the employee is engaged.

f/ Local government includes employees of counties, cities, and special districts. Education includes employees of public schools at both State and local levels.

APPENDIX 3-8

Employment by Industry
Percent Distribution, 1977
Humboldt, Mendocino and California

	Humboldt	Mendocino	California[a]
Total, All Industries	100.0%	100.0%	100.0%
Agricultural W&S	1.7	6.3	4.1
Production	(1.1)	N.A.	(2.8)
Services, Forestry, Fisheries	(0.6)	N.A.	(1.2)
Non-Agricultural W&S	98.3	98.7	95.9
Construction & Mining	3.2	2.7	4.2
Manufacturing	22.7	26.8	19.5
Food Processing	(2.0)	-	(2.1)
Lumber & Wood	(17.9)	(18.1)	(0.1)
Other	(2.7)	(8.6)	(17.3)
Transportation & Public Utilities	6.4	4.9	5.5
Wholesale Trade	3.6	2.6	5.7
Retail Trade	16.4	16.4	16.4
Finance, Insurance & Real Estate	3.1	2.8	5.5
Services	18.1	17.0	19.1
Government	24.9	20.5	20.1
Federal	(1.9)	(2.0)	(3.7)
State	(2.4)	(2.2)	(16.4)
Local & Education	(20.5)	(16.3)	

a) 1976.

Source: EDAWinc.

APPENDIX 3-8

ANNUAL WAGES ($ MILLIONS) AND PERCENT DISTRIBUTION OF WAGES BY INDUSTRY

HUMBOLDT, MENDOCINO AND CALIFORNIA, 1977

Industry	Humboldt Wages	Humboldt Percent	Mendocino Wages	Mendocino Percent	California Wages	California Percent
Agriculture, Forestry, and Fisheries	$ 5.9	1.4	$ 7.0	3.3	$2,329.4	2.2
Mineral Extraction	--	--	--	--	687.5	0.6
Contract Construction	16.4	3.8	6.1	2.9	5,928.5	5.5
Manufacturing	132.1	30.9	78.2	37.1	24,467.8	22.9
Transportation, Communication Utilities	33.7	7.9	13.9	6.6	7,827.9	7.3
Wholesale Trade	17.5	4.1	6.5	3.1	7,371.3	6.9
Retail Trade	47.8	11.2	24.2	11.5	11,612.4	10.8
Finance, Insurance, and Real Estate	10.9	2.5	5.9	2.8	5,997.9	5.6
Services	50.6	11.8	21.3	10.1	17,489.0	16.3
Government	112.9	126.4	47.6	22.6	23,159.3	21.7
Federal	10.7	2.5	5.6	2.7	5,008.0	4.7
State	42.5	9.9	7.2	3.4	4,686.8	4.4
Local	59.7	13.9	34.8	16.5	13,464.5	12.6
Non-classifiable	0.3	0.1	--	0.1	208.6	0.2
TOTAL	$428.1	100.0	$210.7	100.1	$107,079.6	100.0

Source: California Employment and Payrolls, October-December, 1977, Employment Development Department from EDAWinc, 1979.

APPENDIX 3-9

TIMBER PRODUCTION

(Thousands of Board Feet)

Year	California Production	Humboldt County Total	Humboldt County % of State	Humboldt County BLM	Humboldt County %[a]	Six Rivers Nat. Forest Total	Six Rivers Nat. Forest %[a]	Mendocino County Total	Mendocino County % of State	Mendocino County BLM	Mendocino County %[a]	Mendocino Nat. Forest Total	Mendocino Nat. Forest %[a]	Region Total	Region % of State	Region BLM	Region %[a]	Region USFS	Region %[a]
1961	5,342,250	1,264,964	23.7	2,859	0.2			683,252	12.8	' 217	0.0			1,948,226	36.5	3,076	0.2		
1962	5,538,928	1,446,944	26.1	186	0.0			726,596	13.1	7,370	1.0			2,173,540	39.2	7,556	0.3		
1963	5,461,046	1,247,281	22.8	12,105	1.0			634,145	11.6	0	0.0			1,881,426	34.5	12,105	0.6		
1964	5,476,265	1,367,838	25.0	12,926	0.9			611,328	11.2	1,605	0.3			1,979,166	36.1	14,531	0.7		
1965	5,271,234	1,301,296	24.7	23,661	1.8	186,836	14.4	540,226	10.2	5,375	1.0			1,841,522	34.9	29,036	1.6		
1966	5,008,318	1,215,325	24.3	5,529	0.5	42,649	3.5	486,948	9.7	1,504	0.3			1,702,273	34.0	7,033	0.4		
1967	5,062,021	1,134,383	22.4	15,010	1.3	98,318	8.7	493,473	9.7	35	0.0			1,627,855	32.2	15,045	0.9		
1968	5,343,898	1,225,648	22.9	17,905	1.5	92,008	7.5	560,985	10.5	521	0.1			1,786,633	33.4	18,426	1.0		
1969	5,000,596	1,165,685	23.3	5,932	0.5	59,190	5.1	525,123	10.5	0	0.0	7,386	1.4	1,690,808	33.8	5,932	0.4	66,576	3.9
1970	4,565,827	1,006,072	22.0	8,862	0.9	87,383	8.7	478,471	10.5	211	0.0	43,267	9.0	1,484,543	32.5	9,073	0.6	130,650	8.8
1971	4,289,617	1,017,805	23.7	2,787	0.3	104,630	10.3	491,336	11.5	8,681	1.8	49,823	10.1	1,509,141	35.2	11,468	0.8	154,453	10.2
1972	5,000,507	1,087,855	21.8	5,286	0.5	31,269	2.9	540,345	10.8	5,465	1.0	37,215	6.9	1,628,200	32.6	10,751	0.7	68,484	4.2
1973	4,923,488	1,098,911	22.3	17	0.0	109,593	10.0	529,869	10.8	774	0.1	28,173	5.3	1,628,780	33.1	791	0.0	137,766	8.5
1974	4,703,614	1,023,604	21.8	13	0.0	65,288	6.4	519,279	11.0	1,143	0.2	6,547	1.3	1,542,883	32.8	1,155	0.0	71,835	4.7
1975	4,334,423	955,313	22.0	16,008	1.7	33,502	3.5	490,542	11.3	11,181	2.3	26,150	5.3	1,445,855	33.4	27,189	1.9	59,652	4.1
1976	4,731,335	959,154	20.2	0	0.0	57,411	6.0	573,106	12.1	2,215	0.4	54,655	9.5	1,532,260	33.4	2,215	0.1	112,066	7.3
1977	4,752,610	903,527	19.0	8,836	1.0	34,832	3.9	617,383	13.0	615	0.1	36,691	5.9	1,520,910	32.0	9,451	0.6	71,523	4.7
Averages																			
(1961-1977)	4,988,587	1,142,447	22.9	8,113	0.7	N.A.	N.A.	558,965	11.2	2,760	0.5	N.A.	N.A.	1,701,412	34.1	10,873	0.6	N.A.	N.A.
(1965-1977)	4,845,191	1,084,198	22.4	8,450	0.8	77,147	7.1	526,699	10.9	2,901	0.6	N.A.	N.A.	1,610,897	33.2	11,351	0.7	N.A.	N.A.
(1969-1977)	4,700,224	1,024,214	21.8	5,305	0.5	64,789	6.3	529,495	11.3	3,365	0.6	32,212	6.1	1,553,709	33.1	8,670	0.6	97,001	6.2

a. Figures are the percent of total county production contributed by BLM and USFS timber sales, respectively.

Sources: State of California, Division of Forestry, State Forest Notes, Sacramento, California, various years.
BLM Ukiah District timber sales records, unpublished.
Terrascan Socio-Economic Base Study on Six Rivers National Forest.
USFS Mendocino National Forest timber sales records, unpublished.

APPENDIX 4-1

SUMMARY OF AVAILABLE KNOWLEDGE AND COMMENTS-WILDLIFE

POSSIBLE TIMBER SALE AREAS

POSSIBLE TIMBER SALE AREAS	INVENTORY	COMMENTS	SELECTED EXAMPLES OF WILDLIFE SPECIES OBSERVED IN AND NEXT TO SALE
Board Camp 70 acres *	NO	Well forested portions (Sec. 22) with meadows and a drainage. Borders U.S. Forest Service at a relatively high elevation.	
Hupa Mountain 69 acres	YES	Well forested blocks amid a heavily logged area with creeks. Possible use by fishers throughout the area.	Douglas squirrel, bear, ringtail golden eagle, band-tailed pigeon, primary cavity users well represented, bluebird, hermit warbler, chestnut-backed chickadee, brown creeper.
Dingman Ridge 153 acres	NO	Approximately 1 mile west of Timbered Ridge. Sale provides fairly generous buffer zone along Eel River. Area contains some small well developed pockets of timber adjacent to the Eel River in a heavily logged and otherwise poorly forested area.	
Pilot Ridge 133 acres *	NO	Two heavily forested tracts with creeks bordering U.S. Forest Service lands. Better timbered private lands in the area have been logged-over. Natural meadows border a portion of the sale area.	
Mad River 205 acres	YES	Heavily logged with small pockets of well developed forest remaining. Forest species still well represented. Private land heavily logged right up to the adjacent Mad River. Forest tracts border and include meadowland.	Shrew mole, western gray squirrel, Douglas squirrel, golden eagle, blue grouse, flicker, pileated woodpecker, Stellars jay, acorn woodpecker, sapsucker, hairy woodpecker, chestnut-backed chickadee, red-breasted nuthatch.
High Peak 337 acres	YES Includes part of sale	Several springs in the area that would require special protection. Adjacent to Spring Creek, a well forested headwater creek of the Eel River. The areas have been heavily logged and much of the area is poorly forested, apparently resulting from poor harvest methods, primarily on private lands.	Ringtail, mountain lion, sharp-shinned hawk, Osprey (nearby), band-tailed pigeon, screech-owl, pygmy owl, pileated woodpecker, and other primary cavity users well represented, Pacific giant salamander, rainbow trout (Mill Creek).
Butte Creek 156 acres *	YES Several locations in stand	Well developed timber stands containing the South Fork of Butte Creek. Forest and old-growth species well represented along all the drainages of Butte Creek. The entire Butte Creek drainage is superior old-growth habitat. Current and planned logging would destroy some of the best habitat in the district. The area has been logged and is being subjected to extensive harvest year after year. Sale borders meadow area that should receive a buffer zone.	Gray squirrel, Douglas squirrel, red tree mouse, red-backed mouse, otter (occasionally), bear, 2 spotted owl territories, goshawk, sharp-shinned hawk, golden eagle, grouse, screech and saw-whet owl, primary cavity nesters well represented, Pacific giant salamander.
Pecwan 90 acres	NO	90 acres of well developed old-growth forest with creek. Approximately 1 mile from Klamath River. Most of the surrounding area is cut-over but is approximately 4 miles from Redwood National Park. Sensitive species inventory needed.	
Big Butte 141 acres	YES	Within the largest area of unlogged forest in the SYU. Area has potential for wide-ranging climax species such as the pine marten, fisher, goshawk, and spotted owl. Located in an area proposed for wilderness. Sale is comprised of mixed stands of conifers of various ages.	Western gray squirrel, Douglas squirrel, red tree mouse, bear, spotted owl (CDFG 1978b) approximately 1 mile southwest of the sale. Unconfirmed goshawk sighting nearby, grouse, screech owl, pygmy owl, all primary cavity nesters including the white-headed woodpecker, Pacific giant salamander.

*2 entries during 10 year period.

POSSIBLE TIMBER SALE AREAS	INVENTORY	COMMENTS	SELECTED EXAMPLES OF WILDLIFE SPECIES OBSERVED IN AND NEXT TO SALE
Pig Toe Ridge * 131 acres	NO	Two blocks in the headwaters of Bear River contain steep well forested canyons. Sec. 5, in conjunction with contiguous BLM land to the north, could provide a desirable old-growth refuge of meaningful size. Borders meadowland areas. Sensitive species inventory required.	
Pine Mountain 83 acres	NO	Two well forested blocks. Sec. 3 borders USFS land and contains a creek. Sec. 22 is a well forested block in a heavily logged and otherwise poorly forested area. The area also contains a natural meadow bordered by forest. Nearby Conley Creek has been logged to its edge. Probably serves as a refuge for forest wildlife in the area and provides thermal and escape cover for large mammals.	
Timbered Ridge 228 acres	YES	Heavily timbered ridge with several drainages approximately 1/2 mile from Eel River. Provides a well timbered block in an otherwise poorly timbered area adjacent to a major river. The desirable north facing slope would be logged.	Western gray squirrel, Douglas squirrel, bear, band-tailed pigeon, pygmy owl, flicker, pileated woodpecker, sapsucker, jays, Mt. chickadee, red-breasted nuthatch, brown creeper.
Red Mountain Creek 53 acres	NO	Inventory 1 mile northwest. Spotted owl observed 1/2 mile west in a small 80 acre BLM stand. This owl may use both tracts in its territory. Additional inventory 1-1/4 mile east. Situated on Red Mountain Creek.	Gray squirrel, Douglas squirrel, coopers hawk, spotted owl (nearby), golden eagle, primary cavity nesters well represented, including flicker, acorn woodpecker, hairy woodpecker, and red-breasted nuthatch, jays, chestnut-backed chickadee, hermit warbler, sharp-tailed snake.
Elkhorn Ridge * 147 acres	YES	Adjacent to Nature Conservency's North Coast Preserve and South Fork of Eel River. Spotted owl present in 1977 at site of a proposed landing. The area contains pockets of timber in drainages in an area heavily vegetated with brush. Some Douglas-fir natural vegetation types are being perpetuated at the Preserve.	Gray squirrel, flying squirrel, spotted owl, pileated woodpecker. A wide variety of animals occur in the area including possible sightings of pine marten and fisher. See study conducted on adjacent Preserve land by Larsen and Grover (1977). Many of the larger and wide ranging mammals and birds no doubt use the adjacent BLM land in conjunction with the Preserve, particularly the spotted owl and goshawk.
Poonkinney Ridge 76 acres	NO	Several small blocks in a heavily logged and otherwise poorly forested area. These small tracts provide some of the last remaining forest in an area dominated by brush and cutover land. These small forest stands contain meadows making them valuable for wildlife.	
West Larabee * 166 acres	YES partial	Several blocks bordering Larabee Creek in a heavily logged area. Land in Sec. 12 contains mostly brush. The 40 acres in Sec. 1 borders and contains a portion of the creek. It is one of the last remaining well forested tracts along the river and is therefore important wildlife habitat and should be retained for wildlife. Larabee Creek is presently in poor condition for anadromous fish from poor logging, road construction, heavy timbering, and flooding. The area needs more inventory.	River otter (Larabee Creek), Douglas squirrel, bear, belted kingfisher, flicker, pileated woodpecker, jays, chestnut-backed chickadee, dipper.
Travis Ranch 129 acres	YES	A well forested area interspersed with meadows. Contains a wide variety of wildlife in local area. A greater variety of primary cavity users are present in nearby Sec. 6 and 11.	Pallid bat, Western gray squirrel, red tree mouse, bear, bobcat, golden eagle, flicker, pileated woodpecker, Mt. chickadee, chestnut-backed chickadee, red-breasted nuthatch, brown creeper.

*2 entries during 10 year period.

POSSIBLE TIMBER SALE AREAS		COMMENTS	SELECTED EXAMPLES OF WILDLIFE SPECIES OBSERVED IN AND NEXT TO SALE
Jewett Rock 168 acres	NO partial survey approx. 2 mi. south	Contains several well forested pockets in two side drainages of Jewett Creek in an otherwise poorly forested area. Situated approximately 1.2 miles from Eel River.	
Brush Mountain 231 acres	YES partial coverage	Two well timbered north facing slopes along Indian Creek and another drainage approximately 1/2 mile from Eel River.	Bear, flicker, pileated woodpecker, acorn woodpecker, jays, mountain chickadee, red-breasted nuthatch.
Davis Creek 188 acres	NO	Heavily forested stand containing Davis Creek, a short coastal stream, and several other side drainagea. Well forested coastal streams are scarce throughout the area. The most desirable north facing slope would be logged. The area merits intensive inventory.	The area could provide nesting habitat for the marbled murrelet.
Red Mountain 121 acres	YES	Endangered species location approximately 2.25 miles away. Spotted owl observation 2 miles south. Contains perennial stream bordered by heavy timber in an area dominated by brush.	Gray squirrel, Douglas squirrel, western red-backed mouse, cooper's hawk, golden eagle, flicker, acorn woodpecker, jays, chestnut-backed chickadee, red-breasted nuthatch, robin, hermit warbler, sharp-tailed snake.
Big Butte 93 acres	YES	The area contains a small drainage of Peterptor Creek approximately one mile from spotted owl observation. Meadows and forest openings present. Further opens up a large area previously unlogged. Will result in 234 acres in similar stage of succession in same area.	Gray squirrel, red tree mouse, flicker, white-headed woodpecker, stellars jay, mountain chickadee, red-breasted nuthatch, brown creeper. Large uncut tracts in this area could provide habitat for pine marten, fisher, goshawk and other wide ranging animals that require large forested areas.
Elkhorn Ridge 78 acres	YES	The area is situated approximately 1/4 mile from South Fork of Eel River in the vicinity of the Nature Conservency's North Coast Preserve. Habitat for the spotted owl would be eliminated.	
Ham Pass IV 67 acres	YES	Area of sale contains high quality old-growth. Spotted owls observed at 3 locations immediately south of area in Sec. 9. Suitable habitat extends into sale area. Owls may remain in area if no additional logging occurs.	Western gray squirrel, Douglas squirrel, bear, sharp-shinned hawk, band-tailed pigeon, screech owl, pygmy owl, flicker, pileated woodpecker, sapsucker, hairy woodpecker, Stellars jay, mountain chickadee, red-breasted nuthatch, brown creeper, robin, hermit warbler.
Salt Creek II 230 acres	NO	Isolated BLM parcel with heavy pockets of timber in several drainages of Salt Creek. The BLM land is large enough to provide suitable habitat for animals requiring large territories. Surrounding areas have been logged or are not well timbered.	Western gray squirrel, bear, spotted owl, goshawk, pileated woodpecker, (large concentration) acorn woodpecker, downy woodpecker, jays, mountain chickadee, red-breasted nuthatch, brown creeper, robin, hermit warbler, pacific tree frog.
Pig Toe Ridge I 151 acres	NO	Heavily forested stands containing two drainages of the Bear River and including the headwaters of Antone Creek. The Bear River drainage is presently in poor condition from poor timber harvesting practices. The country is steep with meadows in vicinity. Needs inventory. A good variety of vegetation types and creeks are present and should provide excellent habitat for a wide variety of wildlife. Little other Federal land occurs in the area and sale would remove the best timber stands from the area.	

POSSIBLE TIMBER SALE AREAS	INVENTORY	COMMENTS	SELECTED EXAMPLES OF WILDLIFE SPECIES OBSERVED IN AND NEXT TO SALE
Poonkinny Ridge II 69 acres	NO	A small heavily forested pocket along a small drainage amid a poorly forested area.	
West Larabee II 190 acres	Partial Survey Sec. 1 for West Larabee I	Much of the proposed action involves hardwood conversion. Some well developed forest bordering Larabee Creek and in several side drainages would be removed. This is especially objectionable because much of the forest in the area including the creekside on private land has been logged. A large percentage of the land throughout the entire area has been logged. If Larabee I and II are carried out, most of the old-growth in the area would be removed. It would be especially undesirable if these two sales occur in a short time frame. Generous buffer zones of old-growth should be left adjacent to the drainages.	See Larabee Creek I.

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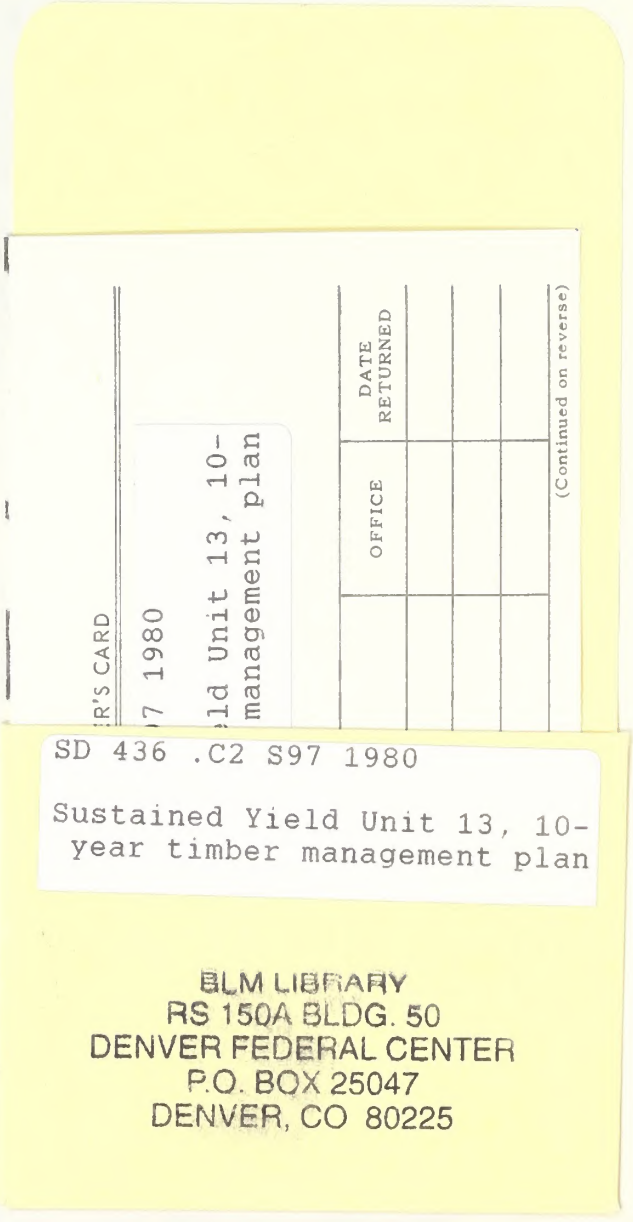

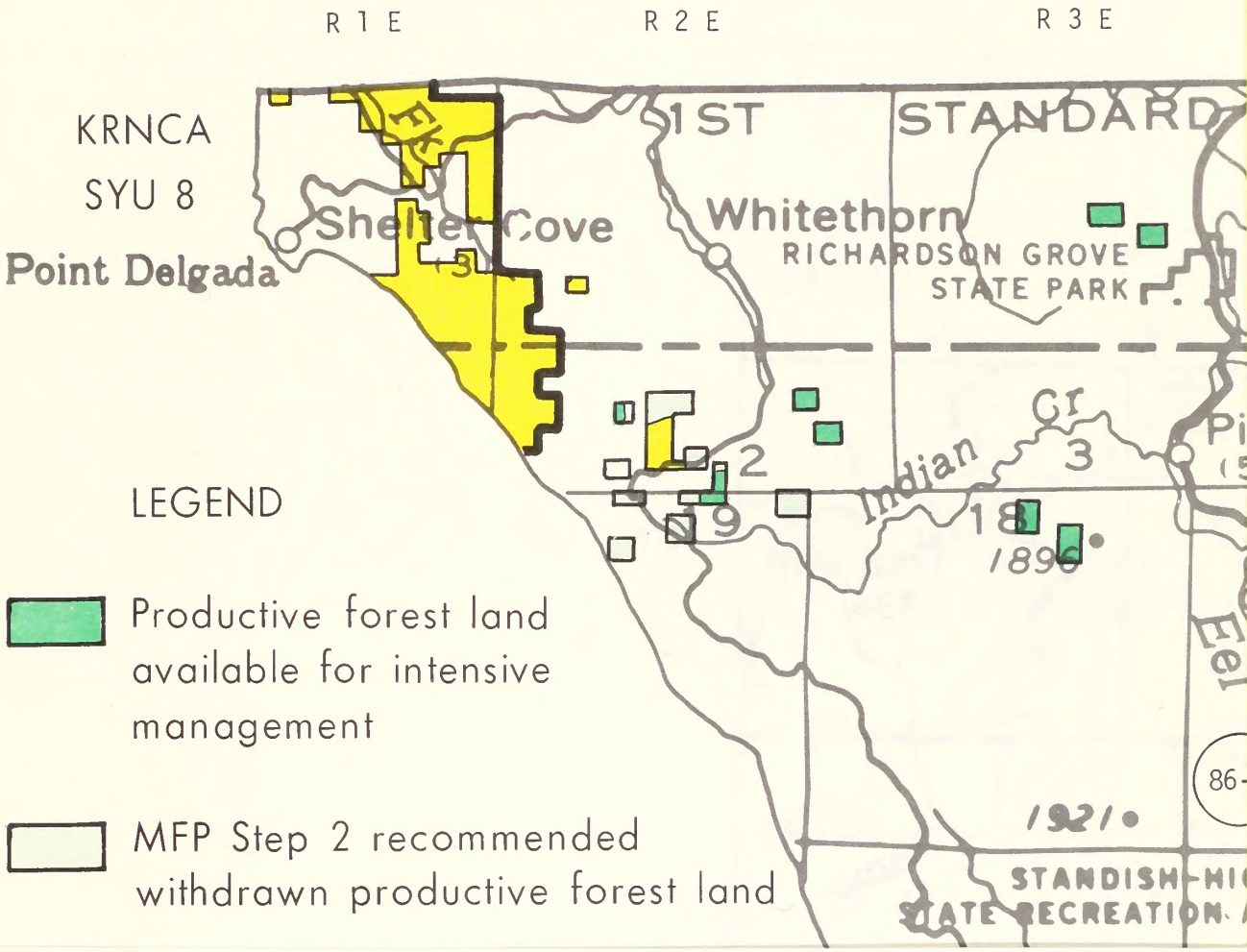

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SYU 8

LEGEND

- Productive forest land available for intensive management
- MFP Step 2 recommended withdrawn productive forest land
- MFP Step 3 withdrawn productive forest land
- Other BLM public lands
- (xx-x) Sale: year-number
- (yy-y) Sale and rehabilitation: year-number
- (zz-z) Rehabilitation: year-number

SCALE: 1" = 3 MILES

N

R 1 E R 2 E R 3 E R 4 E R 5 E R 6 E R 7 E R 8 E HM R 12 W MDM

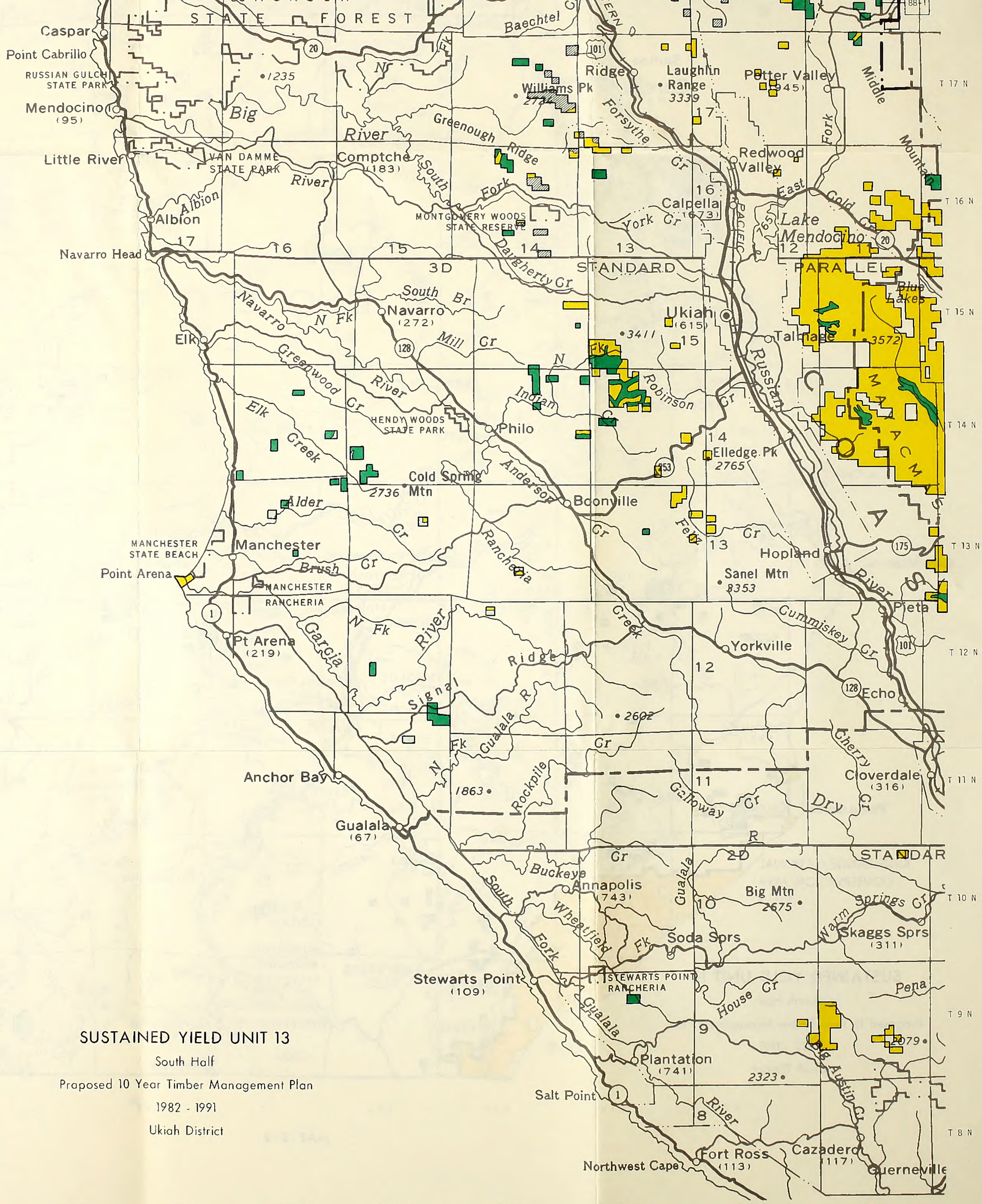
T 5 S HM / T 25 N MDM / R 11 W

1ST STANDARD PARALLEL SOUTH

Point Delgada
Shelter Cove
Whitethorn
RICHARDSON GROVE STATE PARK
Reed Mtn 3089
Island Mountain
Piercy (533)
Reynolds (807)
Bell Springs (3656)
14 Mina
ROUND VALLEY IND RES
M N F
Leech Lake Mtn 6637
STANDISH-HICKEY STATE RECREATION AREA
Cummings
Hales Grove
Empire (1314)
Spyrock (821)
ROUND VALLEY INDIAN RESERVATION
Anthon
Nashmead
Iron Pk
Brush Mtn
Woodman
Covelo (1398)
Rockport
Cape Vizcaino
Dos Rios
Tatu
Farley Peak
Cahto Pk 4233
Laytonville (1648)
LAYTONVILLE RANCHERIA
Branscomb
Westport (115)
Bruhel Point
Longvale (1182)
Brushy Mtn
Sherwood Pk 3207
SHERWOOD RANCHERIA
Inglenook
Arnold
Sanhedrin Mtn
Laguna Point
Cleone
Hearst
Fort Bragg (78)
Ranch
Burbeck
Willits (1364)
Foster Mtn 3104
Northspur
JACKSON STATE FOREST
Caspar
Point Cabrillo
RUSSIAN GULCH STATE PARK
Mendocino (95)
Williams Pk
Laughlin Range 3339
Potter Valley (545)
Little River
VAN DAMME STATE PARK
Comptche (183)
Redwood Valley
Albion
MONTGOMERY WOODS STATE RESERVE
Calpella (1673)
Lake Mendocino
Navarro Head

MENDOCINO

T 24 N / T 23 N / T 22 N / T 21 N / T 20 N / T 19 N / T 18 N / T 17 N / T 16 N / T 15 N



SUSTAINED YIELD UNIT 13

South Half

Praposed 10 Year Timber Management Plan

1982 - 1991

Ukiah District

MAP 2-2

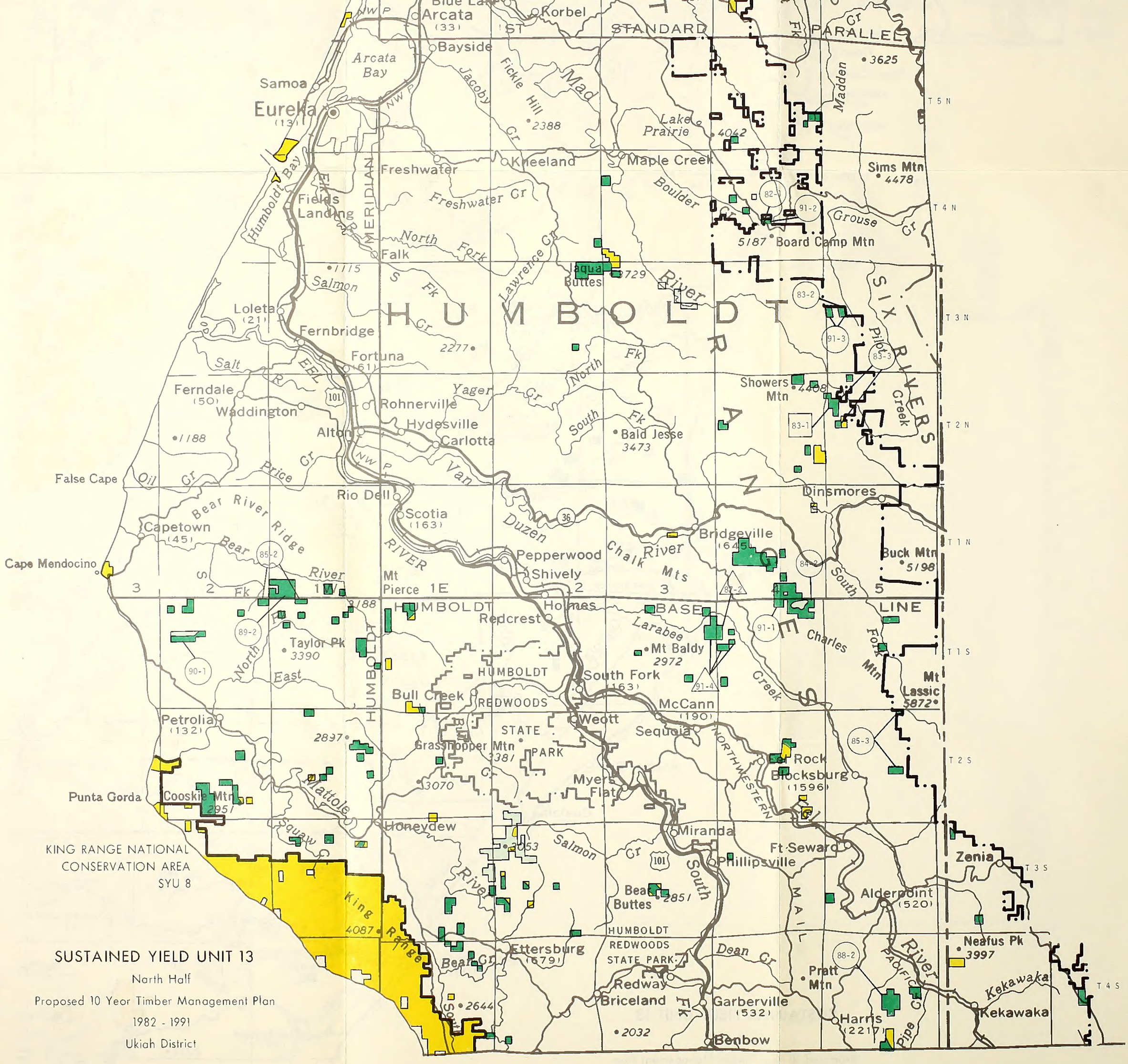
LEGEND

- Productive forest land ovoiloble for intensive monogement
- MFP Step 2 recommended withdrown productive forest land
- MFP Step 3 withdrown productive forest land
- Other BLM public lands
- (xx-x) Sole: year-number
- (yy-y) Sole ond rehobilitation: yeor-number
- (zz-z) Rehobilitotion: yeor-number

SCALE: 1" = 3 MILES

N

PRAIRIE CREEK REDWOODS STATE PARK
DRY LAGOON STATE PARK
BIG LAGOON RANCHERIA
PATRICKS POINT STATE PARK
TRINIDAD RANCHERIA
REDWOOD NATIONAL PARK
HOOPA VALLEY INDIAN RESERVATION
FORTUNA 2D STD PAR
HUMBOLDT T STANDARD PARALLEL
HUMBOLDT MERIDIAN
Klamath River
Trail Mtn 4834
Blue Creek Mtn
Johnsons
Orick (34)
Stone Lagoon
Big Lagoon
Rodgers Pk 2290
Schoolhouse Peak 3092
Burrill Peak 4349
4026
Weitchpec (318)
Patricks Point
Trinidad
Trinidad Head
Hupa Mtn 4093
2631
Westhaven
Little Crannell
Fieldbrook (186)
McKinleyville (1511)
3414
Brannan Mtn 4002
Willow Cr (589)
Salyer
Blue Lake
Arcata (33)
Korbel
Berry Summit 2871
Bayside
Arcata Bay
Samoa
Eureka (13)
Fickle Hill 2388
Lake Prairie 4042
3625
Freshwater
Kneeland
Maple Creek
Sims Mtn 4478
Fields Landing
Falk
1115
Jaqua Buttes 3729
5187 Board Camp Mtn
Loleta (21)
Fernbridge
Fortuna (61)
2277
Ferndale
Showers 4408
Hoopa (351)
Blue Slide Gr
Bluff Creek
Camp Gr
Prairie Cr
Holter Ridge
Tectah Cr
Roach Cr
Tully Gr
Mill Gr
Hostler Gr
Horse Linto Creek
Supply Cr
Lacks Cr
Ridge
Pine
Redwood
Maple Gr
Tip Top Ridge
North Fk
Willow Cr
East Fk
Madden
Mad River
Jacoby Cr
Freshwater Cr
North Fork
Lawrence Cr
S Fk
Yager Cr
Boulder Cr
Grouse Cr
Pilot
Six Rivers
Salt R
EEL R
A & M P
NWP
T 12 N
T 11 N
T 10 N
T 9 N
T 8 N
T 7 N
T 6 N
T 5 N
T 4 N
T 3 N
84-3
82-2
84-4
96
200
299
101
82-1
91-2
83-2
91-3
83-3


Arcata
(33)
Korbel
Bayside
Arcata Bay
Samoa
Eureka
(13)
Blue Lake
NW P
ST
STANDARD
PARALLEL
Jacoby Cr
Fickle Hill
2388
Mad
Lake Prairie
4042
Madden
3625
T 5 N
Humboldt Bay
Elk R
Fields Landing
Freshwater
Freshwater Cr
Kneeland
Maple Creek
Boulder Cr
Sims Mtn
4478
82-1
91-2
Grouse Cr
T 4 N
5187
Board Camp Mtn
MERIDIAN
North Fork
Falk
Lawrence Cr
Jaqua Buttes
3729
River
1115
Salmon
S Fk
Loleta
(21)
Fernbridge
H Cr
2277
HUMBOLDT
SIX RIVERS
83-2
91-3
83-3
T 3 N
Pilot Creek
Salt
R
EEL
Fortuna
(61)
North Fk
Ferndale
(50)
Waddington
101
Rohnerville
Yager Cr
Showers Mtn
4408
1188
Alton
Hydesville
Carlotta
South Fk
Bald Jesse
3473
83-1
T 2 N
False Cape
Oil Cr
Price Cr
NW P
Van Duzen
Rio Dell
Scotia
(163)
Dinsmores
Bear River Ridge
Capetown
(45)
36
Bridgeville
(645)
Buck Mtn
5198
T 1 N
Cape Mendocino
Bear River
85-2
S Fk
RIVER
Mt Pierce 1E
Pepperwood
Shively
Chalk Mts
84-2
South Fork
3
2
1
1W
1888
HUMBOLDT
Redcrest
Holmes
BASE
LINE
Larabee
Mt Baldy
2972
87-2
91-1
Charles
Fork
Mtn
T 1 S
89-2
North Fork
Taylor Pk
3390
East
HUMBOLDT
90-1
South Fork
(163)
91-4
Creek
Mt Lassic
5872
Bull Creek
REDWOODS
McCann
(190)
Petrolia
(132)
Weott
STATE
PARK
Sequoia
NORTHWESTERN
2897
Grasshopper Mtn
3381
Bear Cr
85-3
Rock
Blocksburg
(1596)
T 2 S
3070
Myers Flat
Punta Gorda
Cooskie Mtn
2951
Mattole
Honeydew
Squaw Cr
Miranda
Ft Seward
Zenia
2053
Salmon Cr
101
South Fk
Phillipsville
T 3 S
River
Bear Buttes
2851
MAIL
Alderpoint
(520)
KING RANGE NATIONAL
CONSERVATION AREA
SYU 8
King
4087
Range
HUMBOLDT
REDWOODS
STATE PARK
Ettersburg
(679)
Bear Cr
Dean Cr
88-2
Neafus Pk
3997
Pratt Mtn
Redway
Briceland
Garberville
(532)
Harris
(2217)
Pacific
Pipe
Kekawaka
T 4 S
2644
2032
Benbow
SUSTAINED YIELD UNIT 13
North Half
Proposed 10 Yeor Timber Management Plan
1982 - 1991
Ukiah District
R 2 W
R 1 W
R 1 E
R 2 E
R 3 E
R 4 E
R 5 E
R 6 E

MAP 2-2

S

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